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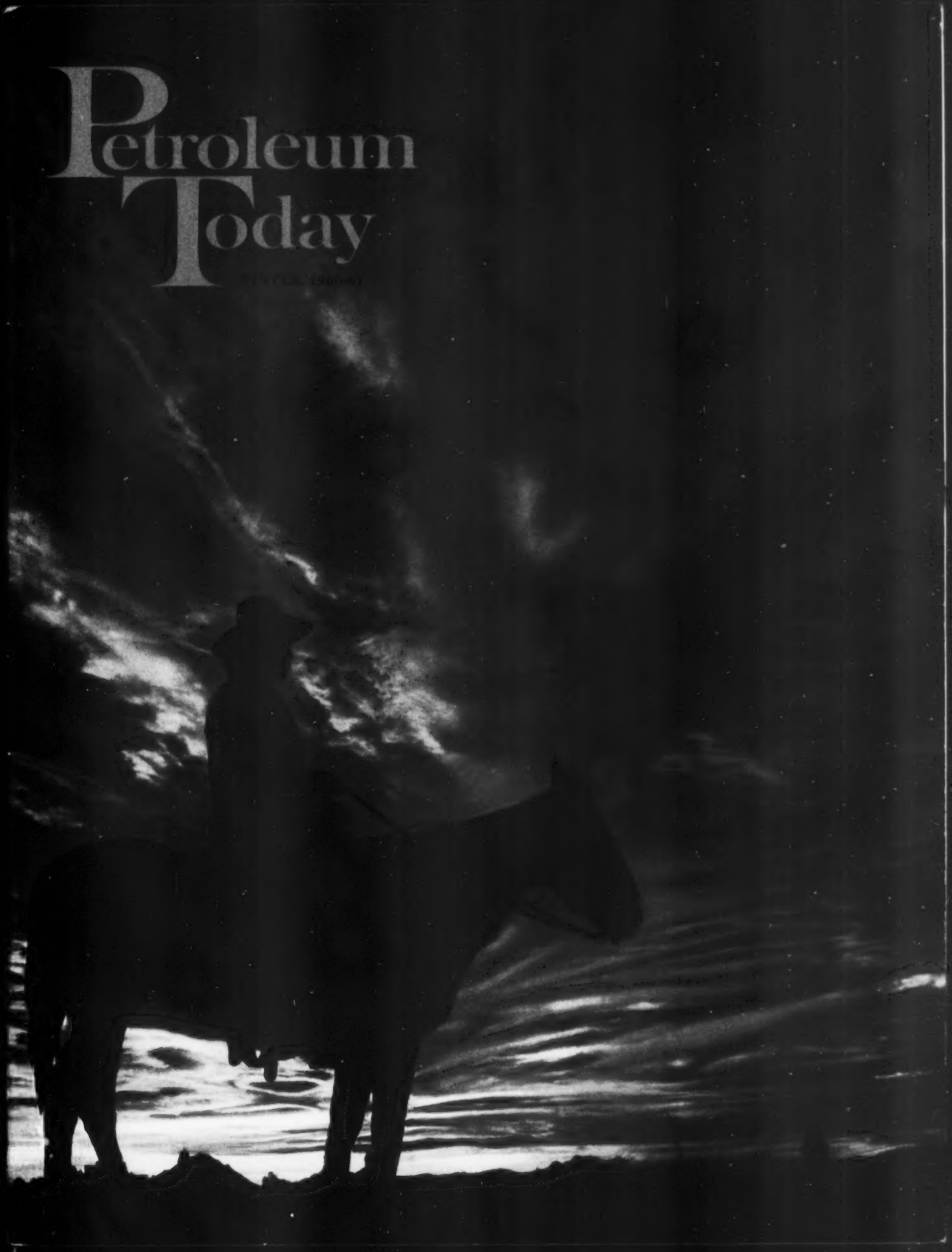

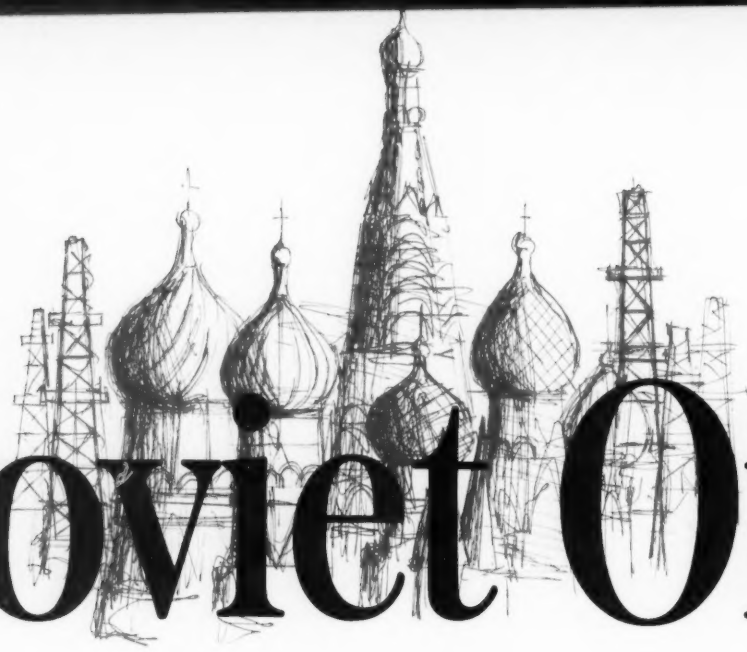

Soviet Oil:

A personal narrative of the experiences and observations of an American oilman during a tour of the Soviet Union: The people, the industry, the threat to the West.

IT was a mild, end-of-summer afternoon, and our delegation had traveled by boat down the Volga River to the refinery town of Syzran. Our Russian hosts had ushered us into a large public building for the customary banquet, and we were just getting seated when we heard people shouting outside. The interpreter explained that they wanted to see the Americans.

I went out on the balcony, and there below me were hundreds of people waving and calling. I told them some basic facts about our country. I told them that the United States is a peaceful nation, that we do not want war, that we welcome the friendship of the Russian people. And they cheered.

Then I went back inside and we ate. The tables were heaped with food—raw fish, caviar, black bread and butter, hot borscht, potatoes, cabbage, shishkabob; I couldn't begin to list it all. I had all but forgotten my talk from the balcony by the time the eating and the speeches were done. But when we left the building, we found that the crowd was still waiting in the street—even the

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The cover: Silhouetted against an Arizona sunset, the Indian and his pony are symbols of a fast-disappearing way of life. See "A Tale of the Navajos," page 13, for the paradoxical story of a proud, independent warrior nation that has at last achieved peace and prosperity.

FUEL FOR THE FIRES OF COMMUNISM

by W. W. Keeler*

children. The eyes of some of the men were wet with tears; some of the women were openly weeping. A little girl came up to me and pinned a medal on my lapel—and then, before I realized what was happening, she kissed me on the cheek. The people wouldn't let us go; they wanted to talk to us, to touch us.

At last we had to have help to get to our cars. And even as we tried to drive away, the people pushed themselves into the car to shake our hands, to express their good will toward the Americans.

This was the scene that will live longest in my memory of the month my colleagues and I spent in the Soviet Union. It represents for me the warmhearted spirit of the Russian people, and it serves to remind me of the sad contrast between these people and their totalitarian government.

We went to Russia as part of an exchange program sponsored by the State Department. (A group of Russian oilmen has since toured petroleum installations in this country.) We were seeking the answers to two questions that are of vital concern to every thinking American and to the free world at large: What is the current status of the Soviet oil industry? In what manner and to what degree will Russia use her petroleum resources to advance her international objectives?

With the example of Cuba fresh in our minds, I don't believe many Americans will fail to appreciate the significance of these matters. Modern industrial societies depend upon petroleum energy. Less-developed nations look to petroleum as essential to an improved standard of living. And the Russians have already used their oil as an economic weapon to advance their political ends.

To meet this threat, the West must know how far the Soviet Union is willing to go, and how much of a financial loss the Reds are willing to absorb in their effort to undermine the market for free world oil. We must also know how far they are able to go. How advanced is their technology? How efficient and dedicated are their workers?

In seeking the answers to these questions, we met with some successes and some notable failures. However, before going into the details of these matters, I should like to set forth some of my observations as to how we, as Americans, were treated by the people and their government.

The attitude of Soviet officialdom was by and large courteous but careful. We were under constant surveillance and were subjected to various kinds of restrictions. We were carefully shepherded from place to place, and strenuous efforts were made to insure that we saw no more than we were meant to see. We guessed that Soviet officials went through our possessions, in our absence from our rooms, on an average of twice a

**Mr. Keeler, executive vice president of Phillips Petroleum Company, was chairman of the delegation of eight oil industry and two Government representatives who went to Russia on a tour sponsored by the U. S. State Department. His colleagues were: Ira Cram, senior vice president, Continental Oil Company; George S. Dunham, director, Socony Mobil Oil Company, Inc.; the late W. M. Elias, vice president, Pan American Petroleum Corporation; George F. Getty, II, president, Tidewater Oil Company; George T. Piercy, manager, Department of Coordination and Petroleum Economics, Standard Oil Company (N. J.); Neal J. Smith, vice president, Chevron Oil Company; Noyes D. Smith, Jr., vice president, Shell Development Company; Robert Ebel, Office of Oil and Gas, and Alexander Gakner, Bureau of Mines, both of the U. S. Department of the Interior.*

SOVIET OIL (continued)

day. One of our men arrived in Russia with a broken lock on his suitcase. He returned to his room one night and found to his amazement that the broken lock had mysteriously been repaired.

There was a strong reluctance on the part of Russian officials to answer many of our questions—questions that American oilmen would have answered without hesitation. We had to sweat for every significant fact we obtained.

The reaction of the people was of another kind. We arrived in the Soviet Union while the trial of Francis Powers, the U-2 pilot, was underway. We saw evidence of the mammoth anti-U. S. propaganda directed at the Russian people. Yet they gave us a warm and friendly welcome.

I have spoken of the reception the people at Syzran gave us. It was by no means the exception. Everywhere we went we were cheered.

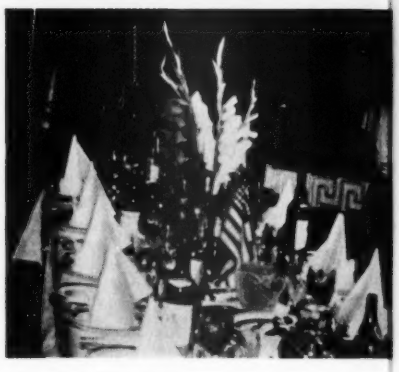
We went to a dance at one refinery town and watched the couples for a few minutes. Some women came up and spoke to us. We didn't know what they were saying; but when they took our arms and pulled us out on the dance floor, we figured it out. There was folk dancing too, and some of us tried our hands at it; but we didn't do too well—we were geeing when we should have been hawing. And all the time the people were laughing and cheering us on.

We attended an amateur theatrical, a comedy, and we were introduced to the crowd. When the show began, the people spent more time watching us—to make sure we were enjoying ourselves—than they did watching the show. An old woman came up and shook our hands. "Now I can die," she said. "I've seen an American."

It was this kind of reaction that led us to believe that Khrushchev had made a wise decision when he canceled President Eisenhower's visit to the Soviet Union. If the Russian people could be this enthusiastic about American businessmen, how much more excited and admiring would they have been toward an American President!

We went to areas where no Americans had been before, where the conditions of life were extremely hard. The people there listened to what we said, they were respectful, but they did not believe our descriptions of life in America. It was beyond their power to imagine.

They wanted to see us, to hear us talk, to pin medals on us; but we felt that they didn't believe us. We came away feeling certain that these people would never overthrow their government. One reason is that, as George Piercy says, they have become as conditioned as the famous Pavlov dog. They have been living under this system for 40 years, and they accept many things without question. Another reason is the undeniably important improvements the Soviets have made in living standards.



Certainly we saw the little huts, with roofs of straw and manure, with livestock and goats sharing the single room with the family. But we also saw the modern apartment buildings rising within sight of the huts. The people's lot is improving, though slowly, because the nation's wealth is being drained off for political purposes. It is in the area of freedom that the Russian people are most "underprivileged."

One of our delegation offered to send an up-to-date edition of a geology book to a technician we met, but the Russian panicked. He did not want to receive any mail from America; he did not want "such a thing" on his record.

In Moscow there is a white line down the center of the street. Official cars speed down this line, and everyone else makes it his business to

These photographs taken by Mr. Keeler show various aspects of the Russian scene as viewed by visiting U.S. oilmen: Lady roadbuilders, part of large Soviet female work force. Lavish banquet table, typical of those prepared for American guests. Pipeline map, illustrating major expansion of the Russian petroleum transportation system. A group of curious youngsters, posed in front of a complex of newly constructed apartments.

get out of the way. There is a great deal of queuing up at restaurants and stores; but when an official arrives, he shoves his way to the front of the line, and there are no complaints. These, however, are relatively minor matters compared to the absence of freedom of speech, freedom of the press, freedom of religion. It is in these areas of life that America is truly a "rich" nation.

The churches, for example, have in many cases been kept open, not as places of worship but as antireligious "museums." An old lady in a black veil was kneeling in prayer before a shrine in one beautiful church we visited when a Russian guide came in with a group of young people. The guide nodded toward the old lady and said something, and the youngsters all laughed. The interpreter told me what had been said: "That's an example of the kind of superstition you will find under the decadent capitalistic system."

The Russians have their own kind of "religion," and from their point of view it appears to be an effective one. It has brought them a higher standard of living; if there is lack of freedom, well, they have never known anything else.

This "religion" has its own gods, its own rituals. Everywhere we went we saw giant statues of Red leaders, and signs exhorting the people to work harder in the name of the revolution and its heroes. I particularly remember one sign: "Lenin is watching us. Lenin is with us." The rituals include propaganda sermons and all sorts of pageantry and organized group activities. Every hour or so, between musical selections, the Government radio blares forth the stock phrases: "war-mongering American capitalists," "Pentagon war lords," etc. Most of the towns we visited had a Palace of Culture where technical courses are given and social activities take place.

The Russians we saw on the streets had grim expressions. But given half a chance, they would break out in smiles and laughter. They were like children; it took very little to make them happy. They did not seem to consider themselves "oppressed" in any way.

As I indicated earlier, one of the prime goals of our visit to the Soviet Union was to learn what we could about the Russian oil industry. Let me present some of our observations and indicate their relevance to the international situation.

Moscow was our point of arrival and departure. From this base we traveled north to Leningrad, far east to the edge of Siberia, and south to Stalingrad and the Caspian Sea. We were transported in airplanes ranging from a single-engine ship to a multi-engine jet, and in railroad cars, buses, autos, and a hydrofoil boat.

Our first glimpse of a large Russian oilfield came in the Ural-Volga region. This area accounts for 70 percent of the nation's oil production and is larger in area than Texas, Louisiana, Oklahoma, and Kansas combined. The region is known as the Second Baku, in honor of that famous port on the Caspian which until recent years produced most of Russia's petroleum.

The Soviet Union has very extensive reserves of petroleum that it is just beginning to tap. The Soviets have had little difficulty finding and producing the oil they require. It is interesting that the term "wildcat well" has a different meaning in Russia from what it does here. With us, a wildcat well is one drilled in unproved territory, where no oil has ever been found; with them, it usually signifies a well on the edge of a known oilfield. We have reached the stage of having to search, at increasingly great risk, for our domestic oil; they are not yet at this stage.

SOVIET OIL (continued)

A comparison of the two nations' current oil production indicates the difference in the "maturity," if you will, of the two industries. We produce more than 2.5 billion barrels a year, almost three times their production.

We estimated that in terms of exploration and production technology the Russians are 10 to 15 years behind the American industry. We figured that the way they set up their equipment, it would take them three times as long to set up a rig as it does over here. There seemed to be an inefficient use of manpower.

Safety standards were more honored in the breach—few men wore safety hats, none wore safety shoes. While we were at one refinery, two members of our delegation fell into a trench when a metal walkway collapsed. Workers set the piece of metal back as though this were a regular occurrence. We saw men walking around head-high hot pipes that lacked any insulation, a practice our industry would not tolerate.

All this is not to say, however, that their technology is inadequate. Actually it does the job as well as they need it to be done. If they were suddenly required to find and produce tremendous new quantities of oil, they could not do so overnight; but from what we saw, they know what they're doing.

In the Baku region we saw offshore drilling in the Russian style. They build roadways on steel pilings out to the well site in the water. The workers and their families live out by the rig in a city literally on stilts.

IN BOTH refining and transportation there are major differences between American and Russian goals and techniques. The Soviets are most concerned with providing diesel fuel for their military and industrial needs, whereas gasoline is our major refinery product. The quality of their products is no higher than the bare minimum; American companies compete on the basis of product quality. Our industry has a refining capacity nearly four times that of the Soviet Union.

And much as our crude-oil production and refining capacity is larger and more efficient than the Russian variety, so is our transportation system far superior. There is nothing in the Soviet Union to compare to America's network of pipelines. But once more I should point out that the Russians have very different goals. As George Dunham has said, their equipment is "adequate for the purpose."

Perhaps the most dramatic difference between the Russian and American oil industries is in the area of marketing. The needs and desires of the Russian people, as consumers, are of relatively minor importance to the leaders of Soviet industry.

We covered approximately 7,300 miles during our trip, and we saw a total of six service stations! And even these were located on side streets and were rather inaccessible. It is up to the autoist to find a station as best he can.

We became accustomed to seeing major roads in large cities virtually empty of traffic. There are half a million autos in the entire nation; we have 60 million cars.

Auto repair facilities in Russia are even scarcer than gasoline stations. A citizen must complete 50 hours of special instruction, including oral and written examinations in mechanics, before he can obtain a driver's license.

I HAVE briefly mentioned some of our non-technical observations of the Russian oil industry. Actually we filled notebook after notebook with figures and statistics and other technical material. Now I should like to answer some of those economic-political questions I posed in the beginning of this article.

What is the current status of the Soviet oil industry? We found that the Russian oilmen know their business. Their skills and equipment, though not up to American standards, are of a high level and are constantly improving. They have extensive research programs underway in all areas of the industry, and their research people are well trained and efficient. (Dr. Noyes Smith commented that you could take a group of American scientists, dress them in Russian clothes and let their hair grow, and they would be difficult to distinguish from their Soviet counterparts.)

The Soviet Union has a Seven Year Plan for the petroleum industry, which calls for doubling of crude-oil production and pipeline mileage by 1965. We believe it quite possible that the Russians will achieve their crude-oil production goal by 1963. We believe that their pipeline goal will be more difficult to achieve, but recent huge Soviet purchases of pipe in Western Europe indicate that they are determined to meet this goal as well.

How efficient and dedicated are Russian workers? Those we saw appeared to know their jobs well. A mammoth training program is underway to equip men and women (40 percent of the refining work force is female) for positions in the expanding industry. Russia's technical education is very impressive and certainly much broader and more comprehensive than our own.

But these people have little understanding of their industry as a whole. There is no effort made, as there is in our own oil industry, to give the worker a sense of his role in the overall picture. Russians have learned not to ask questions,

not to upset the applecart by suggesting new ways of doing things. The decisions come from the top.

This lack of initiative, this effort to replace individual judgment, is a major handicap to optimum efficiency, and it is built into the Soviet way of life. We saw the results of this policy at many of the petroleum installations we visited, where the Russians had simply taken over an American design or technique with little or no application of their own originality.

What are Russia's intentions, and her capabilities, as concerns the use of petroleum as a political and economic weapon? Here we are talking about exports, about the degree to which the Soviet Union plans to, and is able to, sell or barter crude oil and oil products in the world market.

As concerns products, we believe that there are limits to what the Russians can do. The products they sell abroad are the heavier type, which require relatively little refining, and even these are not too well accepted. Several customers have complained that the Red petroleum products were not up to par and have caused equipment maintenance problems. In some cases the customers have discontinued purchases.

Certainly Soviet gasoline is very far from equaling Western standards. After seeing their refineries, we concluded that it would be many years before the Russians could produce gasoline of a quality comparable to our own. As concerns crude oil, however, the picture from our point of view is not so optimistic.

I have indicated that we believe that Russia can achieve her Seven Year Plan in the area of crude-oil production by 1963, two years ahead of schedule. This means that by 1965 she could have an excess crude production of 20 to 30 percent. And she has the natural resources and the skill to go at an even faster pace. I don't feel that there is any question but that Russia can, if she wishes, seriously threaten the economy of the free world oil market. She can do so by selling her oil at little or no profit, or at a loss.

DURING our trip we spoke with Russian leaders in the export field, and they talk a very good commercial line. They understand the oil business. They said to us: "We have a lot of oil and we have just as much right to compete in the world market as anyone else." As believers in competition, we cannot quarrel with that statement. Furthermore, as George Getty points out, the Soviet Union needs foreign currency to purchase goods that are better bought abroad than manufactured at home, and she can obtain this currency by selling her raw materials—such as oil.

However, none of us accepted the Russians' talk of "competition" at face value. We had learned at first hand that they are able to export large quantities of oil only because they withhold the benefits of an oil-powered modern civilization from their people. And we had seen how the Soviet Union is willing to play politics with her oil. For example, we knew that she sold oil to her satellites in Eastern Europe at a much higher price than she charged customers in the West—including Italy and Japan. We knew that in spite of her expressed desire to obtain manufactured goods for her oil, she had jumped at the chance to barter oil for a raw material—Cuban sugar—when it fitted her foreign policy aims.

THE Soviet Union has demonstrated the ability and willingness to use petroleum as a cold war weapon. How far is she planning to go?

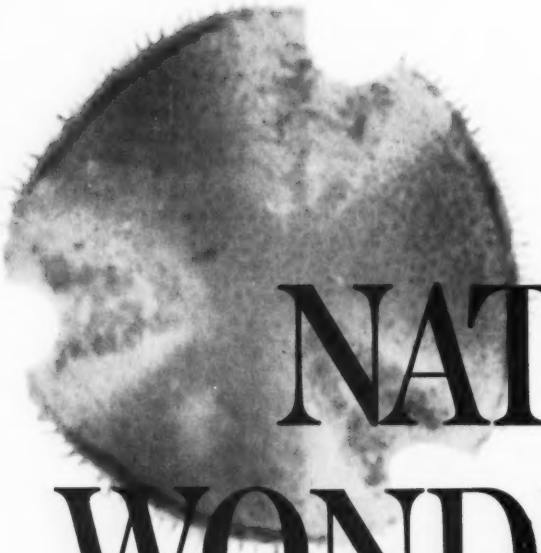
It was in this area that our trip to Russia was most unsatisfactory. We did not get answers to all our questions in regard to her intent—witness the talk of "competition." One spokesman told us that Russia has no plans to raid oil markets, that Western oilmen would find the Soviet Union "easy to get along with." The plans for expansion of Russia's pipeline system through Europe and her increasing shipbuilding programs have made us wary of such statements.

Yet there is some reason to believe that competition of a very different variety may set some limits to Soviet plans. I mean the competition on the part of consumer and industry within Russia for increased amounts of oil and oil products.

We learned that a program to convert all railway engines from coal to diesel and electric power is now underway. More and more Soviet industrial plants are switching from coal to petroleum in the interest of increasing efficiency. And the experience of other nations has shown that once a people is given a taste of improved living standards, their desire for more increases. One wonders how long the Soviet leaders will be able to maintain the deemphasis on consumer goods.

Thus we came away from Russia with a far more realistic idea of the challenge her oil industry presents to the free world than we had when we arrived. We had seen the progress that the Soviet industry has achieved. And we had come to have a renewed admiration for the people.

I remember walking through a small group of houses on land leased from the Government near a Russian refinery. The families living there had built fences about their yards. I remember feeling that these fences demonstrated an urge toward individualism, toward a sense of personal privacy, which was strangely at odds with the theory of the Communist Government. And so we took something else away with us from the Soviet Union: a small but fervent hope that the natural desires of the Russian people for a fuller and freer life might influence the course of their Government's policy, and thereby bring about a greater chance for peace in the world.



NATURE'S WONDER DUST

Scientists have turned up a new clue in the search for petroleum: eons-old pollen and spores.

by Willmon White

ANTHROPOLOGISTS tell us that, eons ago, the caveman wheezed his way through the red-eyed misery of hay fever. Perhaps our hairy ancestor would be somewhat mollified to learn that the pollen he sneezed at is today providing his descendants of the modern world with some very substantial benefits.

Within the past 15 years oil industry research men have undertaken a wholesale investigation of pollen and its cousin-in-nature, the spore. Out of this science of palynology has come a new tool for petroleum exploration, a new device for helping oil hunters provide the nation with abundant and low-cost energy.

Plant pollen and spores are the wonder dust of nature. Pollen is the male sex cell of flowering plants; spores are the reproductive cells of non-flowering, and some flowering, flora. Together they are known to scientists as polospores, and they come in a variety of shapes but in just a single size: tiny.

It takes as many as 800 million to make a level teaspoonful. You could line up 100 of them, end to end, on the head of a pin. And nature produces them in amazing quantity. It is estimated that the forests of a single section of Sweden manufacture 1 *sextillion* a year.

Polospores are dispersed over the entire surface of the earth. They show up thousands of feet in the air and hundreds of miles from any vegetation. (Hence the name "palynology," from the Greek verb *palyno*, "to scatter.") And they have different characteristics depending upon the plant from which they came.

The story starts with the aforementioned caveman. The pollen that he sneezed at settled throughout the world. At the same time, as a current theory has it, petroleum was being formed. Dead plants and the bodies of countless creatures were being carried by rivers into the seas. Polospores traveled along and sank with the organic matter to the sea floor, where they became mixed with mud and sand.

Time passed, and the pressure of layers of material generated tremendous heat at the bottom. The mud turned to sedimentary rock—shales, sandstones, limestones. The organic matter, aided by chemical and bacterial action, turned into oil and

gas. And the oil and gas filtered upward through the porous rock and stopped where it reached the nonporous rock. The polospores remained trapped in their sedimentary rock graves and waited, while the earth shook, rattled, and rolled through geologic time, shoving up mountain ranges and emptying oceans.

Then came the oil hunters, seeking some means of finding petroleum each time they drilled. The oil hunters came up with a wide assortment of ideas, and some of them helped; but there was still no way of being certain—or even confident—that the oil was there below. Approximately 15 years ago an American scientist suggested that polospores might be of some assistance.

Since oilmen cannot "see" oil far below the surface, they must take an indirect route. They must try to find those underground conditions that indicate that oil or gas might be present. Thus they look for porous and nonporous rock of particular kinds, in particular combinations. They want to know how old the rock strata below are, under what environmental conditions they were formed. The oilmen also want to know if the strata have these elements in common with strata they examined some months before, perhaps in a different part of the world, which did produce oil. Today polospores help do the job.

When drilling on a well gets underway, bits of rock called "chips" and "cuttings" are washed up to the surface of the well by drilling fluid. Before palynology came into vogue, oilmen examined the cuttings for fossils and other plant and animal remains. But polospores have proved to have decided advantages.

For one thing, the worldwide "rain" of pollen and spores during much of the earth's history makes them ideal as geologic markers. Animal fossils are few and far between. And when such larger specimens are present, they often fall prey to the grinding teeth of the drill bit, or to the strong laboratory acids required to release them from rock. The tiny polospores are coated with an armor similar to the human fingernail and are all but indestructible.

The cells are ubiquitous, but they are elusive as well. Weather bureaus are able to collect grains for their seasonal pollen-count report by exposing an adhesive slide atop a tall building. Palynologists, however, have a more difficult and painstaking assignment.

The first step is to liberate the polospores from their rocky tombs. After physical and chemical treatment, a typical sample is reduced from a teaspoonful to a few drops of cloudy liquid floating a thousand or more specimens. Then the cells are tinted, mounted on slides, and examined under a high-power microscope fitted with a 35-millimeter camera.

Now the different species can be identified by family markings—a scar here, a pore there. They can be compared with the "catalog" of spore and pollen types and ages that industry scientists are compiling. And these findings can in turn be correlated with botanical and geological data, until finally the palynologist can tell the oil hunter just what he's drilling through.

Here's how the analysis is put to work:

- In Alaska an expensive wildcat well is being drilled below 10,000 feet. No show of oil or gas has been uncovered and the question arises: Should the project be given up? Polospore specimens age-date the penetrated stratum, indicating it to be of too recent vintage to bear oil. The well is abandoned.
- In Texas identical polospores are found at levels of 5,000 and 7,000 feet in two wells several miles apart. The rock formations are the same age, and the layers trend upward toward the surface. This points the way to an anticline, an upward fold in the earth's strata. Oil and gas are often found under such an arch. A well in the middle may uncover some.
- In Venezuela a U. S. palynologist knows the drill bit has probed an ancient lagoon because of the abundance of a particular type of pollen. The lagoon suggests the nearness of a primeval seashore, another favorite hiding place for oil. A second well shows a decline in the count of the particular pollen, indicating farther distance from the old seashore. A third attempt, between the two dry holes, brings in a producer.

Today's oil industry is engaged in two phases of palynology. One is what scientists call "control" work; that is, building up reference collections, filling gaps in the geologic timetable just as was done 40 years ago with the larger animal fossils. The second phase is the practical field application of polospore research.

At the present time the "control" phase is consuming a major portion of the total industry effort. Gradually, though, the emphasis is expected to shift to the second phase.

What further contributions palynology will make when the cataloging process is complete can only be guessed at. But it is already certain that the study of nature's ancient wonder dust has become an important element in the oil scientist's hunt for liquid energy.

Petroleum Potpourri

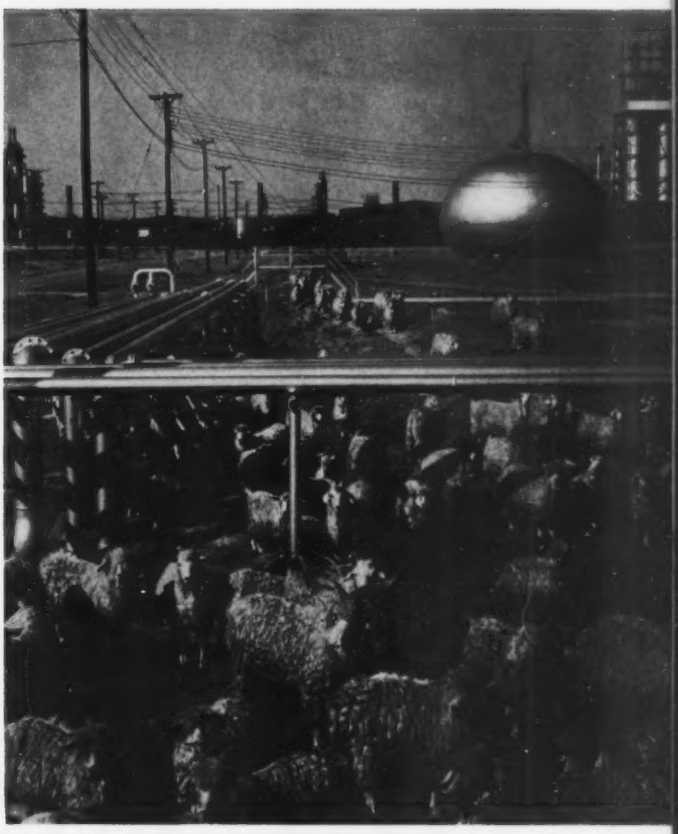
A kaleidoscopic portrait of the American oilman and his industry

Lucille Ball stars in *Wildcat*, a new Broadway musical comedy set in a rough-and-tough old Southwest town. Here skeptical citizens listen as she boasts of her talents as an oil hunter.

High school student is one of thousands of youths getting on-the-job training at service stations as part of the fast-growing national Distributive Education program.

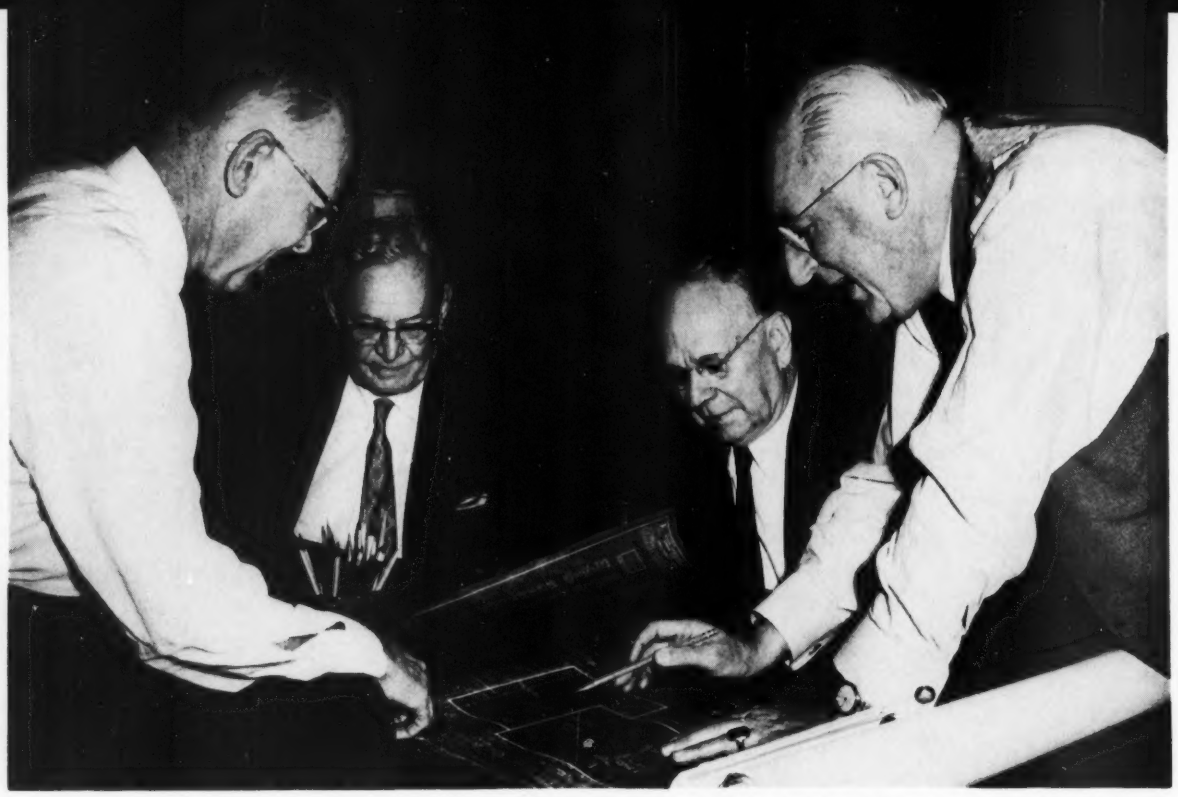
Several months ago students at the Maryland School for the Deaf saw a demonstration of petroleum products, including a horn activated by an oil-based chemical, freon. When the horn sounded, many of the deaf students reacted. They had not heard, but rather "felt" the blast. Today the device is used for activities such as basketball.

Caught in a web of steel and shadows, a workman hoists a bucket to the top of a 3,000-barrel oil storage tank under construction. Such tanks assure that oil will be on hand to meet consumer need.



Complex equipment is an aid to oil refinery efficiency and product quality, but at this Ohio installation "grasscutting" goats help out too.

Oil products go to market by pipeline, truck, or rail depending upon which technique is most economical under specific conditions.



Charlie Younts, pencil in hand, outlines a new project for some Retired Associates colleagues at RA headquarters on Peachtree Street.

Old Warhorse Still in Harness

by William Hammack

Many Americans face the prospect of retirement with dread. Charlie Younts had the same feeling, but he did something about it.

"IF an old warhorse who's been in harness all his life ever stops, brother, he just withers. And the first thing you know, some parson is giving the old boy's funeral sermon."

That's Charles Rolphi Younts preaching; and what Younts preaches, he practices.

Last year Younts retired from the board chairmanship of the Plantation Pipe Line Company. The day he left the job, the desk in his office disappeared. The next day Younts and desk were installed in a suite on Peachtree Street, Atlanta, and Retired Associates was in business —the business of helping others.

"If a retired man has a continuing interest," says Younts, "chances are he'll keep going strong. So any retired executive who joins us is really doing himself a favor." And he adds: "But it's really more than that for all of us. I've always believed a person should do something for his God. Now I have the opportunity to do something full time."

The combination of hardheaded approach and high-minded ideal is typical of this complex individualist who has started an organization that might well be an inspiration to other senior citizens.

William Hammack is a veteran feature writer on the staff of The Atlanta Journal and Constitution Magazine.

"We work for nonprofit and charitable institutions at no cost to them," Younts explains. "We" includes an electrical engineer, an accountant, a construction engineer, and a building contractor, plus a list of other specialists ready "on call." Their approach is on a straightforward, businesslike level. If there is a building to be constructed, a bathroom to be installed, a service program to be organized, Retired Associates has men on its list with the skill to do the job.

RA clients and projects cover a broad range. Members have installed an alarm system for the deaf children taught at Atlanta Speech School, Inc. They have provided, at one-third the usual cost, the cafeteria equipment for the Blue Ridge Assembly, a meeting ground for YMCA activities. They have helped set up a retirement program for a group of ministers.

THE Churches Homes for Business Girls, Inc., is another of the organizations served by Retired Associates, and one of Younts' personal enthusiasms. It is a nonprofit, nonsectarian undertaking that provides a homelike atmosphere with parental-type controls for hundreds of girls who flock to Atlanta to work or attend school.

"When I began at Churches Homes," says Younts, "there was a hell of a lot of work to be done, brother, and nobody but me to do it."

Younts tried to enlist Charles J. Ingraham, retired executive of a Southern oil firm, but Ingraham firmly resisted: "No, sir, I have a hard enough time getting along with one woman." Ingraham resisted, but he finally gave in. As he says: "That guy Younts can charm the rabbits out of the brier patch."

Before Ingraham, the maintenance work on the Churches Homes was done by contractors. Ingraham gathered his own crews, cut renovation and maintenance costs by thousands of dollars.

"When I took the job," Ingraham says, "I knew what I was getting into because I know Charlie Younts. He's a perfectionist, a real driver. He visits the Homes constantly, asks a million questions. If he sees an operation that displeases him, he bellows: 'We're going to do what the Lord wants, but damned if we're going to do it this way.'

"Then he blesses out the house mothers, gradually starts sweet-talking them, winds up complimenting everybody. By the time he leaves, they're all ready to break their necks to do what he wants."

A longtime oil industry associate calls Younts "the finest actor I've ever seen." He describes a performance he witnessed some 20 years ago when Younts was named sales manager of an oil company's New York division.

"Sales were in a slump. Younts had a chart made showing all the company's divisions. New York was at the bottom. He called a meeting and put this big chart right out front. He begged them to work harder. He started talking about how terrible it is to be on the bottom. His voice choked up; tears streamed from his eyes; and he pulled out the biggest damned handkerchief I've ever seen, wiped his eyes, and trudged from the room with bowed head. As he passed me, he gave me a big wink.

"Every salesman sat there like he'd been hit on the head with a maul. But, man, they started to move after that. Just one month later his division led all the rest in percentage increase in sales."

THE Younts sense of drama was developed early. As a teenager he sold 10-cent-a-week $100 insurance policies around his hometown of Pineville, North Carolina. An engineer friend tells this story: "The first time Charlie heard that one of his clients had passed away, he raced to the deceased's home and in front of all the neighbors who had come to pay their respects he handed over to the widow $100 in brand new one-dollar bills. Word got around that young Charlie Younts paid off before the coffin was in the ground, and he sold more policies than you could shake a stick at."

Younts started in the oil business as an office boy for a firm in Charlotte, North Carolina, some 49 years ago. During World War I he served as a hard-nosed first sergeant. He was in charge of sales for a large Eastern area when he was summoned to the head office in New York in 1940 and informed that he was going into the pipeline business.

On the face of it, Younts seemed to be the wrong man. He knew next to nothing about pipelines. But he had two attributes that the head of the new Plantation Pipe Line would need. He had an intimate knowledge of the South and Southern customs,

Former board chairman Younts visits with pipeline employees before retirement.

Younts exchanges greetings with girls at Churches Homes, one of the organizations served by Retired Associates.

and he was superlatively endowed with the ability to sell a new idea.

Plantation was an unusual project. At the time, there were no sizable oil pipelines in the Southeast, and the residents could be expected to raise some questions about building this one. Younts was the man who could make landowners and local authorities understand how much a pipeline could contribute to the area's economic growth, not only because it was his job but because he believed in the oil industry and in the future of the South.

Younts demanded that the line have a maximum capacity of 60,000 barrels of oil products a day, that it have a 12-inch diameter. Some company engineers said his idea wasn't technically feasible; economists said there wasn't that much of a market for the gasoline and other petroleum products that the line would carry. But Younts could sell an idea to his own management as well as to the customers. The line went through as he wanted it, and within a year additional pumping stations were being built. Product demand had reached 92,000 barrels a day, and more pressure was needed to push the extra oil through the pipe.

Younts was not an engineer, but he knew how to put together a team of men who could do the job. (Even today he has no pretenses about his do-it-yourself abilities. When Retired Associates undertakes a technical project, Younts watches his colleagues admiringly.)

Malcolm E. Grant, who succeeded Younts as Plantation president, puts it this way: "Younts created Plantation. He was Plantation. He quarterbacked the entire operation."

And when Younts called a play, he meant what he said. For example, he told contractors laying the pipe not to work near any churches on Sundays. One Sabbath morning he received a call—the bulldozers were interrupting services at a nearby church. Younts had the operators arrested, and there was no further trouble from that quarter.

When the pipeline went into operation, Younts paid wages higher than the prevailing rates. "A couple of businessmen yelled he was going to wreck the wage structure," Grant recalls, "but Charlie stuck to his guns. Developments proved he was right. As the wage differential between Southern and Northern salaries lessened, Southern buying power increased, and the workers' standard of living rose."

The pipeline Younts built is today more than 2,400 miles in length, runs through seven States, and has a total daily capacity of 335,000 barrels. It handles 83 different oil products for 20 different shippers, and it does the job with a low-cost efficiency that was unheard of a decade ago.

CHARLIE YOUNTS had to be rough and tough and stubborn to create Plantation; yet he has the admiration and respect and friendship of the men with whom he has worked, and for good reason.

One associate who recalls dozens of knockdown drag-out battles with Younts says: "Charlie may not go along with what you suggest; but he'll always listen to you, and his door is always open."

A pipeline worker comments: "Sure we know Uncle Charlie. He knows us too." Colleagues claim Younts is on a first-name basis with every Plantation employee.

An Atlanta civic leader says: "Younts comes up with more ideas than a dog has fleas. I don't say they're all good; but with as many as he has, some are bound to be good. And he's trying to do the best job he can."

Dr. J. M. Lesesne, president of Erskine College (in Due West, South Carolina), describes benefactor Younts: "He gets in every basement, sees every leaking faucet, finds any broken windows. One minute he'll be in the kitchen of the cafeteria, and the next in the supply room of the chemistry lab." Dr. Lesesne praises not only the material accomplishments, but the spirit behind the man, the urge to do good.

Younts and his wife, the former Willie Antoinette Camp, of Franklin, Virginia, have no children of their own, but they have sent several youngsters through college and have helped support many more. Among those they have aided is a group of Formosan orphans they saw on a trip to the Orient.

The couple recently returned from a trip to Africa where Younts presented medical supplies to Dr. Albert Schweitzer at his hospital in Gabon. Younts had assembled the gift kit—a gross of assorted hypodermic needles and six dozen hypodermic syringes—after consulting with Atlanta doctors to determine what supplies Dr. Schweitzer needed most. "Money by itself isn't enough," says Younts. "You've got to get in there and help."

Charlie Younts is a deeply religious man, an elder of the small (303 members) Associated Reformed Presbyterian Church in Doraville, 10 miles outside Atlanta. He gave up drinking 18 years ago when he started taking part in YMCA activities—"I felt I should set an example." He even stopped smoking his customary 10 to 15 cigars a day, though it was not easy. ("He used to open the door between our offices so he could smell my cigar smoke," an associate recalls.)

NOW that Retired Associates has been launched, Younts spends large chunks of his time with clergymen and similarly dedicated individuals far from the rough-and-tumble of the business world. His devotion to good works, always impressive, is now what a friend has called "formidable." But Younts is not a stereotyped "do-gooder."

"I'll be having dinner with a friend," he reports soberly, "and I see that he's feeling no pain after all those martinis. I tell him one of our charities needs a piano—maybe 'just' a baby grand. The guy's in an expansive mood and he says, 'OK, I'll buy one for you.' Next day he finds out what a good baby grand costs—around 2,000 bucks." At this point, Younts pauses to chuckle a bit. "Now, all I really want is a second-hand piano, you know, one that's good enough for the kids to practice on. I can get one for no more than $400. But, you know, sometimes I just don't let on for a while. You'd be surprised how relieved the guy is when I tell him."

A TALE OF THE NAVAJOS

by Wallace West

After centuries of suffering, they have found prosperity, peace, and the promise of a brighter tomorrow.

FIVE centuries ago the tribe of Athabascan Indians we know as the Navajos swept down from the northern reaches of the American Continent and seized vast sections of the Southwest. The history of these people in their new land is among the most violent, and paradoxical, ever recorded.

They called themselves *Dine*—"The People." They were a nation of proud and independent warrior clans, and they scattered all other tribes before them on their southward march.

The People settled in fertile sections of what is now Arizona, New Mexico, and Utah, where they intermarried with the Pueblos. They learned cattle raising and farming (earning them the Tewa name *Navajo*, meaning "cultivated fields"), and they prospered.

Spanish explorers were the first white men The People encountered. The missionaries were friends, but not so the lordly conquistadores who came in search of the mythical gold-roofed Seven Cities of Cibola. The People looked upon them as intruders. They accepted gifts of sheep, goats, and horses from the Europeans—then used the horses to good advantage when they joined the Pueblos in chasing the conquistadores south of the Gila River in 1680. The battle between Navajo and white man, destined to bring so much suffering to both sides, had been joined.

In the years that followed, The People continued to prosper in their new land, but they maintained their warrior tradition. For amusement, exercise, and profit, their young braves staged raids into Mexico and against their longtime enemies, the buffalo-hunting Utes and Apaches.

On May 13, 1846, the United States Government declared war on Mexico. Three months later General Stephen W. Kearny led his troops into Santa Fe and announced that the entire area, including the land occupied by the Navajos, was now under U. S. control.

Kearny called for a meeting with The People, but it failed of its purpose. The Navajos looked upon the increasing numbers of white settlers

much as they had looked upon the conquistadores: as intruders, as usurpers of Navajo land. The tide of settlement continued, and The People raided and plundered the newcomers at every opportunity.

THE bloody battle continued for nearly two decades. The People could inflict heavy damage, but they were handicapped by a lack of unity—unity that only a single supreme chieftain could provide. The Army sent out expedition after expedition to control the Navajos but could not gain a decisive victory.

There were infrequent periods of peace. Treaties were signed, promises made, but all in vain; the warfare went on. Language differences made communication between the two parties difficult. White traders misled the Navajos for personal profit. Mutual hatred made any solution of the problem impossible.

Fort Defiance in New Mexico was a key Army post. In 1858 the Navajos staged a full-scale attack on the fort but were repulsed. The white settlers stayed; and The People saw their territory, comprising some 20 million acres of fertile land, gradually whittled down. When demands of the War Between the States forced the Army to withdraw troops from Fort Defiance, Navajo braves took advantage of the situation and drastically increased their attacks on settlers.

As soon as Union troops could be spared from the war, the Government determined to end the Navajo problem once and for all. In 1863 Colonel Kit Carson was placed in command of a mammoth roundup, aimed at collecting the tribe and herding it into the Bosque Redondo (Round Forest) on the Pecos River.

The men of the 51 Navajo clans recognized the danger. They met in a grand council and agreed, at last, to elect a paramount war chief. After an all-day appeal to their wind and water spirits, The People chose their leader, an experienced warrior named Barboncito (Little Big Beard). Over objections of the young firebrands, Barboncito ordered the tribe to retreat into the impregnable Canyon de Chelly in northeastern Arizona.

Carson wrote of the campaign:

"The mountains they live in . . . cannot be penetrated by troops. There are canons [*sic*] in their country thirty miles in length, with walls a thousand feet high . . . in which they can hide and cultivate the ground. . . . they had some two or three thousand peach trees, which were mostly destroyed by my troops. . . . In the walls of the canon they have regular houses built in the crevices, from which they fire and roll down huge stones on an enemy. . . . No small-arms can injure them, and artillery cannot be used. . . . I first destroyed their crops, and harassed them until the snow fell very deep in the canons. . . . I took twelve hundred sheep from them. . . . It took me and three hundred men most of one day to destroy a field of corn."

Carson's policy proved grimly effective. Several thousand of the strongest braves managed to climb the canyon walls and escape. The rest—some 9,000 men, women, and children—were living skeletons when they finally surrendered in 1864.

WHAT followed is known in Navajo tradition as The Long Walk. Infants, the aged, and the sick were permitted to make the trip to Bosque Redondo in carts with the supplies. The rest were forced to walk every step of the 300 miles. When they arrived, they found that the "forest" consisted of a few stunted trees, and that their new home was a mere section of a 40-square-mile reservation.

The Navajos adapted themselves to the new

Federal troops take census of tribe at Bosque Redondo, where the Navajos endured disease and starvation.

situation as best they could. They set about trying to wrest a living from the land. It was during this period that their women took over from army officers' wives the costume of flounced calico skirts, tight velvet bodices, and gay shawls that they still wear. But the experiment that the Government had undertaken at Bosque Redondo to control Navajo raiding and to teach The People the ways of peace was a failure from the start.

The land was unfit for cultivation; game was scarce; disease was rampant. Insects, drought, flood, and windstorm frustrated Navajo crop-raising efforts. The People died like flies.

Hardened "mountain man" though he was, Carson could not stomach the situation at the new reservation. He and others drafted petitions based on humanitarian grounds, but they were ignored.

Dollars-and-cents appeals proved more successful: the program at Bosque Redondo had already cost the Federal Government a million dollars and would cost more; if The People were returned to their beloved lands, they might become self-supporting again. Another factor was the constant danger that the braves who had escaped from the Canyon de Chelly would attack in an effort to free the captured Indians.

In the spring of 1868 General William T. Sherman arrived at Bosque Redondo with the intention of concluding a treaty with the Navajos.

Sherman's meeting with Barboncito has become a part of the tribe's folklore, and the chieftain's eloquence on the occasion (aided by a turquoise he is said to have held under his tongue and a knife he had hidden in his moccasin) has been hailed by generations of The People.

Sherman had been considering relocating the tribe in Oklahoma, but the Navajos were determined that they be returned to their homeland. When the two men faced each other, the chieftain drew out the knife and threw it on the floor. "If you wish to send my people away from their home," he said, "first take the knife and kill me."

The treaty that was signed called for The People's return to the land they loved, but to the worst 3½-million-acre fraction of the millions of acres they had once roamed. The new start was hard, but they endured all with admirable stoicism.

J. H. Beadle, a traveler and historian, wrote of them during these years:

"In all their troubles the Navajos are lively, cheerful and looking for better times. To see ten thousand people able and willing to do almost any kind of work, with natural talents of no mean order, and most anxious to improve, to see such a people shut up on this barren plateau, and kept out of that part of their country in which they could live, literally perishing without a chance to help themselves, was enough to sadden even a hard heart. . . ."

THE years of relatively settled life among the Pueblos and the years of defeat and suffering at the hands of the white man had wrought a change in The People. They maintained their proud traditions, but they were no longer the warrior nomads of an earlier day. And their ability to endure, which had helped win them permission to return to their land, again inspired Congress to take cognizance of their plight. By 1934 the Treaty Reservation had been expanded until it included 15 million acres of beautiful but still unproductive buttes, canyons, and desert.

Expansion of the Navajo land base could not keep pace with population growth. There were 40,000 people on the reservation in 1938. And the problem was aggravated by soil erosion, caused by overgrazing. The Department of the Interior met the situation by ordering that the number of livestock using reservation rangeland be greatly reduced. This well-meaning provision failed to take into account the fact that The People loved their livestock with a consuming passion. They reacted by fighting the reduction program bitterly for more than a decade, and they resent it to this day.

The start of World War II produced a temporary labor vacuum into which the Navajos swarmed with whoops of delight. Thousands of them found off-reservation employment on railroads and in mining and mechanized agriculture. Some 3,600 young men learned new skills while serving with distinction in the Armed Forces.

At the close of the war, however, wages on which a majority of Navajo families had come to depend ended abruptly. They were forced back onto a reservation where they could not use their new technical training.

In 1950 the tribe received a congressional appropriation of $88½ million to be used for its rehabilitation over a 10-year period.

Today Navajos guide their own destiny. Here J. Maurice McCabe, tribal council executive, addresses a meeting.

Under the direction of a centralized Tribal Council, set up at Government insistence, the Navajo families and clans managed to eke out a bare existence from stock raising, intensive cultivation of fertile patches of land, and production of blankets and silver jewelry for the tourist trade.

The uranium boom that followed America's development of the atomic bomb brought the first hint of better times. The reservation on the mile-high Colorado Plateau was found to contain the nation's richest deposits of radioactive ores. Royalties began to pour into empty tribal coffers. The "worthless" lands to which the Navajos had been relegated had suddenly become valuable.

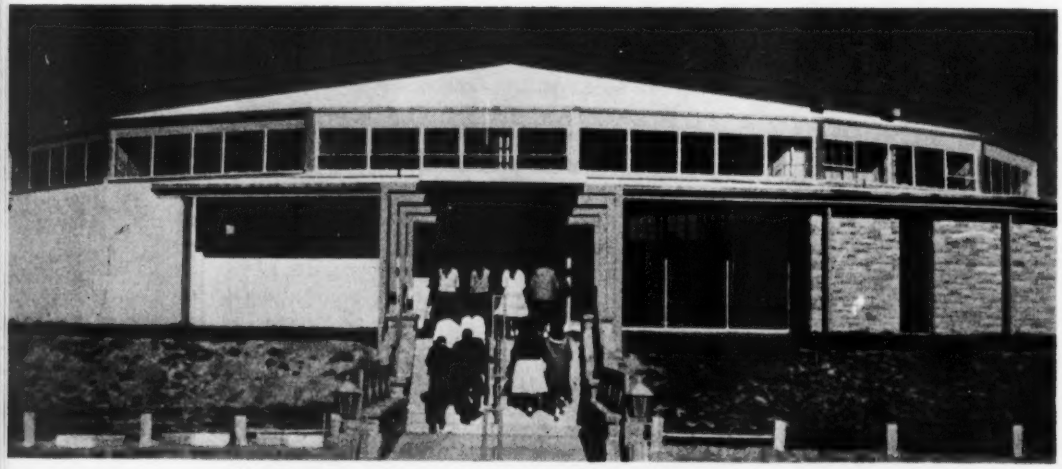
THEN, in the summer of 1950, several large oil and gas strikes were made in northwestern New Mexico. Oilmen had spent years and large sums of money in exploration of the area. Now they flocked to the site. Leases on mile-square lots of Indian land were sold at Government-supervised auctions.

Oil wells went down by the hundreds. Roads and pipelines were rushed to completion. Towns such as Farmington, New Mexico, threatened to burst at the seams as oil and transportation companies opened scores of offices there.

The People began to earn handsome oilfield wages. The food and lumber industries burgeoned. And petroleum royalties, bonuses, and rentals brought great wealth to the tribe (current oil revenue is about $2 million monthly).

The changes that these royalties have brought

Symbols of Navajo past and present: an Indian shepherd stands gazing at modern oil well rig on the Utah prairie.



Navajo community center at Window Rock, Arizona, was built by tribe with royalties from petroleum discoveries.

to the Navajos are most dramatically seen at Window Rock, Arizona, site of tribal headquarters. The brisk little town, half-surrounded by mammoth lion-colored buttes, nestles beneath a giant natural bridge that gives it its name. It boasts a council house built in the shape of a traditional eight-sided hut, or hogan, but many times larger; a huge community center for fairs and dances; a modern restaurant, trading post, and motel; many widely spaced modern cottages; and a group of smart, one-story office buildings where white specialists and college-trained Navajos direct the complex affairs of this emerging nation within a nation.

Tribal Chairman Paul Jones directs Navajo activities with Vice Chairman Scott Preston and Executive Secretary J. Maurice McCabe. Jones shows the aplomb developed by 20 years of work and study off the reservation plus 27 years devoted to the service of his people. Preston, who wears his hair in a queue in the ancient Navajo style, speaks for conservative members of the tribe. McCabe is the hard-hitting executive type.

Chairman Jones' desk is always piled high with reports and letters, but he is never too busy to talk about The People. He can reminisce about the days when life on the reservation was a continual struggle to avoid starvation, but he prefers to discuss the present: The $7½ million sawmill that will enable the tribe to exploit its vast timber reserves, the soil conservation and irrigation projects, the hundreds of schools being built by the Bureau of Indian Affairs but staffed and supported entirely by the tribe.

"We expect," says Chairman Jones, "that by 1962 scholarships will be putting 1,279 youngsters through college, high schools will be graduating 1,600 each year, and grade schools plus adult classes will have banished illiteracy."

He admits that the influx of outsiders has brought some difficulties, for the Navajos are a proud and canny people. In the early years some opposed leases because they feared that oil operations might harm their rangeland or livestock. They have learned better since, and oilmen have learned to adapt to Indian customs.

Indian employee opens valve on natural gas pipeline. Oil industry has brought new job opportunities to the Navajos.

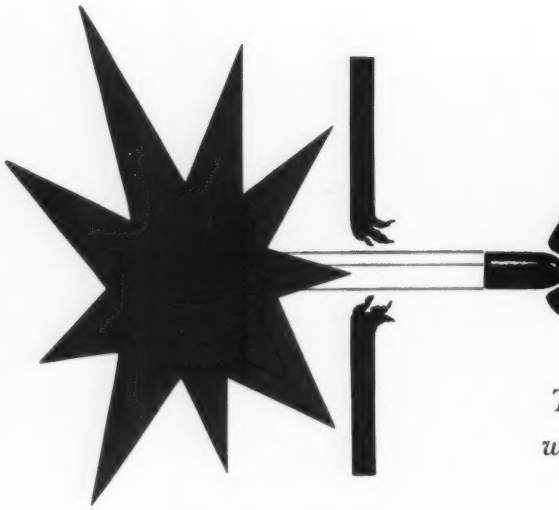
ANY misunderstandings between oilmen and Navajos are brought to the tribe's Oil and Gas Office, which is under the supervision of D. A. "Curly" Jamison. His offices are at Shiprock, Arizona, but he spends much of his time making aerial patrols of the widely scattered oilfields.

A major weapon in Jamison's peacemaking arsenal is the record of the oil companies in the area. They have, for example, drilled hundreds of desperately needed water wells throughout the reservation. And their on-the-job training programs are making many hundreds of Navajos eligible for better paying, more interesting jobs.

The partnership between oilmen and Navajos is the basic industrial factor in the life of The People in modern times. But such leaders as Chairman Jones look upon the new-found unity within the tribe itself as of greater importance in the long run, and the contrast between such cooperation and the traditional individualism of the clans does not escape him. It is of a piece with the other paradoxes of Navajo history.

Here are the warrior Indians who won their greatest victories by their passive endurance of oppression. Here are the descendants of those starving families who were exiled to a barren wasteland, now 85,000 strong and flourishing on that wasteland's hidden resources. Here are the clans who five centuries ago swept down from the north in search of a better life and have, at last, found it.

Navajo nurse, trained under tribal education program, records symptoms of her young Indian patient.



Oil's Amazing

Their targets are rocks, their weapons are heavyweights, and a bull's-eye may bring a dead well to life.

HUSKY Paul De Rosier, 35, chuckles, remembering that chill day last hunting season, the hinterland cafe, and the two sportsmen who, like himself, were thawing out over a convivial cup of coffee.

"Hunting running antelope in Wyoming," one of the men was saying, "I must have run through 40 rounds of ammunition."

His companion nodded. "Shot twice that many rounds myself, at jackrabbits in Nebraska."

De Rosier grinned and broke into the conversation.

"Just yesterday," he said nonchalantly, "I fired maybe 400 rounds."

The first hunter put down his coffee, turned slowly on his counter stool, and eyed De Rosier. Skeptically he noted the stranger's hardhat, mud-caked boots, and grimy mackinaw pulled over a khaki work shirt. Hardly the portrait of a sporting gunner, much less a sharpshooter who shrugged off 400 rounds—more than many hunters fire at game animals in a decade—as routine.

"Target shooting?" the antelope hunter asked dryly and not a little dubiously.

"Nope," grinned De Rosier, "shootin' oil wells."

For petroleum gunner De Rosier there are no closed seasons, no bag limits nor, for that matter, any outlawed species. If it's oil—or even the suspicion of oil—it's fair game for De Rosier's "perforating gun," a subterranean blunderbuss that shoots real bullets, as many as 180 of them without reloading, triggered from as far away as 21,000 feet.

Yet, unlike his fellow nimrods, sharpshooter De Rosier never lays eyes on his quarry: underground rock strata. Neither must he await dawn's first light before legally unlimbering his gun (petroleum marksmen shoot as often at midnight as at noon). At "hunt's" end, after as many as 1,500 bull's-eyes, may be a producing oil well for his client, a kind of liquid memento to his marksmanship.

"I bring 'em in alive," De Rosier shrugs, "and back from the dead too." He and his three-man crew are often summoned to shoot new life—and renewed production—into wells that years ago would have had to be abandoned.

"An oil well," says DeRosier, a deer hunter by avocation, "is the only thing I know that you can shoot to life."

NO ordinary gunner is Paul De Rosier. More maverick still is his perforating gun. Almost as big in diameter as the oil well casing pipe it fits, it is really many guns in one. A heavyweight (some perforating guns weigh nearly a ton), it shoots special bullets ranging from caliber .22 to .50.

A flatbed truck, like a mobile gun case, transports the perforator in sections. Heading afield, De Rosier "packs" a dozen or more four- to six-foot gun sections, each preloaded with 10 to 30 bullets. At the target site he and his crew assemble the gun, mate as many as six sections one to another, and rig them with an electrical firing mechanism. What's finally lowered into the well, and toward target, may measure 36 feet in length and carry more than 180 solid steel bullets.

On signal, the bullets blast from their individual firing chambers, punching sideways through the well's thick steel casing, through cement and

g Marksmen

by James Joseph

mud surrounding the casing—and, hopefully, into oil-bearing sands. Often the petroleum is locked in the sedimentary rock. The bullets open channels through which the oil (if it's there) can flow.

"With a barrage like that," says a gunner, "an oil sand simply comes uncorked. When it does, you've got a producing well."

To bring in a well—make it produce—calls for the kind of sharpshooting that, if practiced on the average target range, would earn for the marksman a citation of excellence and a chestful of medals.

But in the oilfields such Daniel Boone-like shooting is expected, and rewarded in cash. A company pays $500 to $5,000 (and up) for the services of a team of petroleum gunners.

Oildom's amazing markmen can draw a bead on a mere hand-thick target (a stratum) lying a mile or more underground and riddle it to production. Just as routinely, they perforate suspected oil sands while an unwanted water stratum, but inches away, is left untouched. On occasion, petroleum gunners have returned to a once-riddled well, dropped their perforator to 3,000 feet, and slammed another bullet into the very hole they'd blasted years before.

HELPING them to pinpoint the bull's-eye is a kind of subterranean "scope sight": an oil well logging device that, by electronics, gamma rays, or other means, maps the lay of the underground structure from surface all the way down to well bottom.

Structure map in hand, a geologist usually calls the shots.

Giant "perforating gun" is used to blast open underground rock strata that may contain oil. Here two rigmen lower gun into casing.

Paul De Rosier fires steel bullets from a cabin thousands of feet above his target. It may be 10 hours before the job is completed.

"Let's perforate that sand, starting at the 2,500-foot level," he'll tell a sharpshooter. And the gunner does.

Or perhaps, hoping to boost lagging outflows of liquid energy from an aging well, the geologist prescribes a quick burst of gunfire on the off chance that a stratum, hitherto untested, may yield petroleum.

In calling the shots, geologists often specify how many bullets and precisely where. Some ask for six "perforations" every foot, and some for but four. Occasionally the prescription calls for a single shot every dozen inches or so. Much depends on the makeup of a suspected stratum, its hardness, thickness, and compaction.

Nor do sharpshooters like Paul De Rosier flinch from the sights when a geologist demands what amounts to two-dimensional accuracy: a shot placed not only at a precise depth, but in a precise direction. To do it, the marksman may shoot with a "directional gun," a perforator with firing chambers along only one side (normally, they're spaced completely around the gun). Or he may fire gas jets instead of bullets—high-velocity blasts of gas that have much of the force, though not the fracturing impact, of bullets.

Most difficult assignment is a "moving" shot—something like asking a rider on a galloping horse to hit a bull's-eye from 5,000 feet.

Rising through the strata (at a rate of perhaps three to six feet a minute), the gun fires on the move while the shooter, hunched before a complex control board, spots the shots. "Moving" shots aim to speed up the shooting (in firing 1,000 to 1,500 rounds in exceptionally deep wells, a shooter may not relax his trigger finger for 10 to 13 hours).

FOLLOW Paul De Rosier to a newly drilled well along the Southern California coast and you'll see a pro in action. The rig towers in the air above the drilling floor, below which the well plummets thousands of feet. The scenery is bleak. The air drips with fog.

Beyond De Rosier's truck-mounted shooting booth works his young gun crew. Hoistman Ronald Rooney mans the portable hoist that lifts each six-foot-long, four-inch-in-diameter steel gun section to the drill rig's floor. There, rigmen Bob Wheeler and Don Rutherford join three sections into a single 18-foot gun, its machined firing chambers preloaded with 75 bullets.

Assembled and suspended from a slender steel cable, its center an electrical line, the gun begins its descent toward the depths.

De Rosier takes it from there. From his shooting booth he controls the descent, one hand on the cable drum's brake, the other working a complex of dials, his eyes on the depth-indicating odometer.

"Begin your first run at 4,000 feet," the geologist orders. De Rosier nods.

Weeks of drilling and more than $100,000 have been wagered on this moment. An oil company, the chips down, is betting that sharpshooter De Rosier can bring her in, riddle her to production and profit.

Tension grips the firing booth. The truck engine is running, and the whole cab shakes. On the fire control panel half a dozen safety signal lights blink from green to red. Over all drones the hum of cable paying out from its drum.

But De Rosier and the geologist listen only for the odometer's depth-telling click. Their eyes study the carefully etched strata map with its myriad bull's-eyes, every one of them a target. And every target vital.

"Four thousand feet," De Rosier says and flips a switch. The firing circuit is closed now, ready to shoot.

TONIGHT, along a mere 78 of the well's more than 4,000 feet, De Rosier has to place 450 shots—and make every one count. The firing plan is already set. With a full gun load, 75 shots, he'll riddle 13 feet of rock. Then he'll pull up, give the crew time to uncouple and attach three freshly loaded gun sections. Then down again, to pick up where he left off. Six passes along those 78 feet of suspected oil-bearing sands, and he'll have it. That, and with luck, a producing well.

"First pass," De Rosier says, his thumb poised above the "trigger," an electrical firing switch on the console before him.

Suddenly the odometer clicks, ticking off the feet as the gun, at 4,000 feet, begins its ascent.

Quickly, rhythmically, De Rosier triggers a shot—one jab of his thumb. The sound of the shot is picked up by an intercom receiver inside the gun, transmitted to the rig floor and on into the booth. De Rosier nods. No misfire. Another shot, and another. Seventy-five times in as many seconds he jabs the switch. And 75 times the confirming report rasps staticlike over the intercom.

Thirty minutes pass from the time the big gun drops into the well until it's back on the surface and ready for reloading. Another three hours, and Paul De Rosier, his eyes red with fatigue, climbs from his shooter's seat.

Four hundred and fifty shots and as many bull's-eyes. If oil lurks in those deeply hidden strata, it is now uncorked and already flowing. An hour passes. Finally word comes: "We did it," Don Rutherford announces. A test sample of oil affirms a producer.

"Good shooting," the geologist nods approvingly as De Rosier lights up a smoke. A grin snaps the fatigue from De Rosier's face.

Two words—"good shooting." They're nothing a sharpshooter can frame over his mantel, nothing he can pin to his lapel. But for Paul De Rosier, they're trophy enough.

Fifty-one years ago Mrs. John R. Ramsey became the first woman to drive an auto coast to coast; today she's still at it.

WOMAN MOTORIST OF THE CENTURY

by Norman Daniels

ON a wet Wednesday morning in the spring of 1909 four young ladies set forth from New York in a Maxwell touring car. Two months later—after braving storms, floods, and Indians—they reached their destination, San Francisco; and their leader, Mrs. John R. Ramsey, became the first woman ever to drive coast to coast.

A few weeks ago I sat in the parlor of Mrs. Ramsey's home in Covina, California, and listened as she described that journey. She is a charming, gray-haired lady of 72, full of zest for life. She had just arrived home from Detroit where, on October 20 at the 43d National Automobile Show in that city's mammoth Cobo Hall, the American Automobile Association had named her "Woman Motorist of the Century" and the Automobile Manufacturers Association had designated her its "First Lady of Automotive Travel."

Mrs. Ramsey has driven cross country so many times she has lost count. "I drove to visit my daughter in New Jersey this year," she reported, "and I believe it was my 26th trip." Then she added with a twinkle, "Of course it's a lot different today from what it was 51 years ago."

In 1909 the Women's Motoring Club of Hackensack, New Jersey, had 40 members, and Mrs. Ramsey, wife of an attorney (who was later elected to Congress), was its president. When the Maxwell company suggested the trip as a dramatic demonstration of the auto's coming-of-age, she accepted the challenge. Her companions were her two sisters-in-law, Mrs. H. R. Powell and Mrs. William Atwood, and a friend, Miss Helen Jahn.

It was an exciting experience for the young women, and their enthusiasm was only slightly dampened by the heavy rain that followed them after they left New York on June 9. The roads in the East were good for those days—hard-packed

Lady autoists before departure, Mrs. Ramsey at far right.

They're off! New York leave-taking was wet but hopeful.

dirt and even asphalt in a few places—and they made good time. Their best day during the entire trip came between Buffalo and Cleveland, when they covered 198 miles.

The lady pioneers were met en route by motoring fans and feted by Maxwell dealers. A parade would form at the outskirts of town, and the ladies would head a noisy procession of horn-tooting autos down the main street. In the larger cities the well-traveled Maxwell was put on display and attracted sizable crowds. When the ladies were ready to leave, the car was returned to them, freshly polished and with a full tank of gasoline—a charitable gesture that rendered impossible any attempt to keep an accurate record of fuel consumption.

The stopover in Chicago was memorable because of the opportunity to have their clothes dry-cleaned. Each woman had a single suitcase and the traveling costume (tan covert cloth suits) she wore on the road.

MRS. RAMSEY'S party was traveling at a leisurely pace. They were not out to create any speed records, and they were seeing the countryside as no woman had seen it before.

They arrived at Rochelle, Illinois, in the midst of a heavy thunderstorm, and the rains continued in the area for two weeks, turning the roads into sticky black gumbo. But the women plowed ahead.

Sometimes they had to call for help—once when the rear axle rested on the crown of a muddy road, leaving the rear wheels spinning in the air. More often they made beds for the wheels and pulled out of the mire themselves.

They kept going—even when other drivers stopped at farmhouses, put up their cars in the barn, and continued on by train. Maxwell dealers sent out pilot cars, but more than once Mrs. Ramsey had to pull *these* cars out of the mud.

At Vail, Iowa, the roads were awash, and a king-size flood was sweeping down the Missouri Valley. Mrs. Ramsey and her companions began to encounter real trouble, but they refused to ship their car ahead by rail. They managed to get to Sioux City, but it was quite a struggle.

The day they left Sioux City—where they crossed the Missouri into Jackson, Nebraska—was the worst of the entire trip. The mud was so deep they rarely came out of low gear. Then the radiator boiled dry, between farms, with no help in sight.

"We used cut-glass toothbrush holders from a traveling set," Mrs. Ramsey recalled. "We scooped up ditch water drop by drop and made a few miles. Then we would have to stop, repeat the process, and go on until finally we were out of the mud."

After a day's driving, they had covered barely 13 miles.

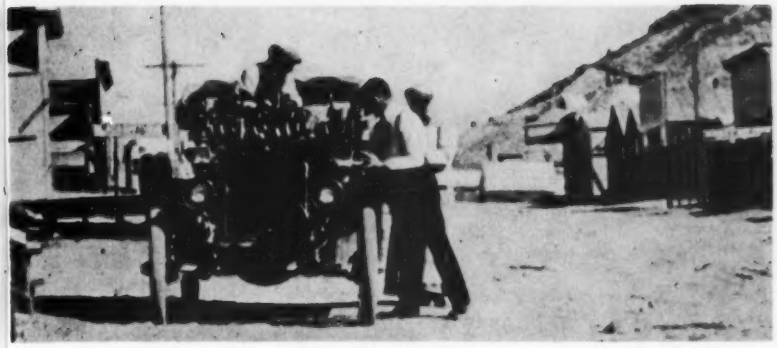
Only twice did the women have to spend the night in their car. In Iowa they had to wait until rain-swollen Weasel Creek subsided. In Utah they paused midway across a desert to catch a few hours of sleep—it was 3 a.m. and they had driven all day—before continuing onward.

At no point in the journey were the ladies lost, thanks to Mrs. Ramsey's fine sense of direction and to her foresight in purchasing the best maps available.

Wyoming brought new problems and dangers. The mountains were wild and beautiful, but the roads were virtually nonexistent. Near Fort Steele the bridge over the Platte River had been washed away. A railroad trestle offered the only chance for driving across the raging waters.

The railroad had only a single track, and the rails were not far enough apart for the Maxwell to fit between them. Mrs. Ramsey had to drive the car so that it straddled one rail.

"I'd slip the clutch and bump along a little way, then shove the clutch in and start the whole process over again," she said. Sixty feet below her the Platte brawled angrily among the rocks. "It was no easy job. In fact, I was so jostled around I felt as though I had appendicitis when I reached the other end. But I was too busy to be scared."



The Maxwell stopped for oil at the frontier town of Rawhide, Nevada.

Lady pioneers found Western roads few and far between.

Mrs. Ramsey admitted that there was one point on the route through Wyoming when she *was* scared.

"We were driving through arroyo country, and the road wound around many buttes and hillocks. Suddenly we saw a group of Indians on horseback. They were going at a furious pace and were keeping parallel with us."

The Indians were bare from the waist up, and they carried drawn bows. Mrs. Ramsey remembered recent reports of killings by Indians in Oklahoma. The ladies held their breaths and kept going.

"All at once," Mrs. Ramsey said, "the Indians changed course and headed directly for us. At that point I was completely terrified. But all of a sudden they veered away from us and continued their chase—after a jackrabbit. Actually, that's what they had been after all the time, but the sagebrush had kept the jackrabbit from our view."

BEYOND Laramie they climbed to an elevation of 8,000 feet and followed grass-grown trails through cuts and canyons. Once on the other side, they found driving conditions even worse. Stones jutting out of the road had to be studied for clearance; shifting sand bogged them down. Sometimes they used a trick that still works: they deflated the tires on sandy stretches to obtain greater traction.

During the course of their trip, the ladies became experts at changing tires. They used 11 of the smooth-faced variety, and they made certain they always had a few extra on hand.

They had also learned to make certain their gasoline tank was full. "Occasionally we ran out of drinking water," Mrs. Ramsey said, "but only once did we run out of gasoline. Once was enough." They depended upon Maxwell dealers to supply gas and oil or, in the absence of dealers, they stopped at garages or grocery stores where the fuel was then sold. In the East, in those days of no gasoline taxes, the fuel was generally priced at 21 cents a gallon; but the cost advanced the farther west they went. At one site in Utah gasoline cost 62.5 cents a gallon because it had to be carried 90 miles from the nearest railroad by horse-drawn wagon. "If you were wise," Mrs. Ramsey said, "you saw to it that the gas was strained through a funnel into the tank. In those days the rubber hose had a way of going to pieces and fouling the line."

It was also in Utah that the car hit a gopher hole, and a blacksmith on a nearby ranch was pressed into service. It took him hours, working over a forge, but eventually the car was repaired. They had been lucky to find any kind of repairman so far west, Mrs. Ramsey said. (The closest thing to a service station they encountered in that part of the nation was in Rawhide, Nevada—a wooden platform with a primitive pump set atop it.)

The last night of their journey was spent in Hayward, California, where the ladies freshened up for their arrival in San Francisco the following day. And it was a triumphal arrival, complete with crowds, Maxwell people, and the press.

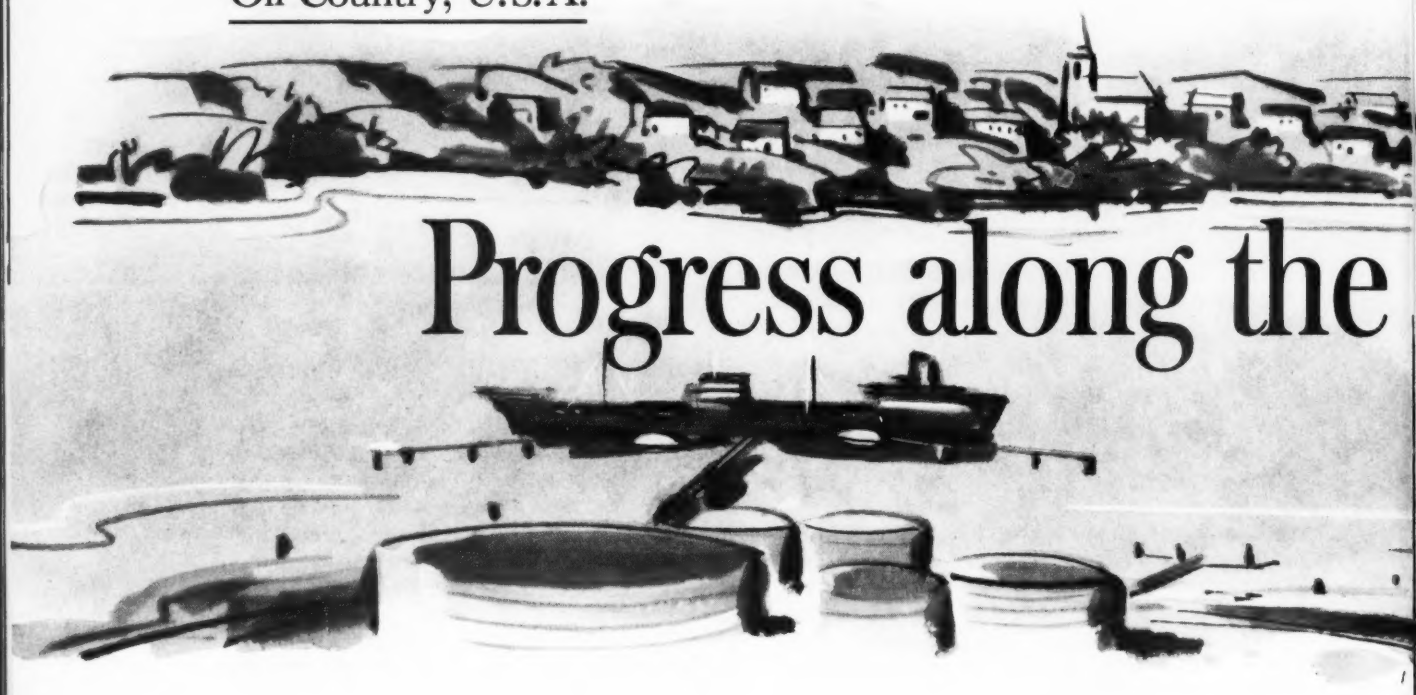
How did she feel at the end of the trip?

"Quietly elated," Mrs. Ramsey says today. "When I undertook the trip, I had an itch to do what others—men—had done. And when it was all over, I felt a sense of satisfaction and accomplishment."

The changes that half a century have brought in American traveling never cease to amaze Mrs. Ramsey. Her modern auto (she never keeps one very long) travels on an amazing network of highways the likes of which the world has never seen. Gasoline is readily available, and she doesn't have to worry about its quality. Service stations have mechanics to change her tires and make repairs—and rest rooms, telephones, and free maps.

Of course, as she pointed out, Mrs. Ramsey missed none of these luxuries when she made her historic trip. They hadn't been dreamed of at the time. If a garageman had offered to wash her windshield, she would have been considerably surprised. That Maxwell didn't have one.

Oil Country, U.S.A.



Progress along the

Colonial Newington boasts a proud past, but the tiny New Hampshire village was in the doldrums until the tankers came to town.

THE sons of New Hampshire have a long and proud tradition. You name it, a man from New Hampshire has done it—with maybe a single major exception. No one has ever brought oil up from our rocky soil.

That's right. We've no oil wells in New Hampshire. But don't sell us short; we *have* struck oil.

The place I have in mind is a town called Newington, up the Piscataqua River from Portsmouth. It's a small town, even by New Hampshire standards—some 500 permanent residents, all of six square miles in size. It has one of the most colorful histories of any town in the country. And what's happened there during the past few years has been as exciting and colorful as most anything in the town's past.

Some 5 million barrels of petroleum products went through the port of Newington last year. They came in by tanker and were unloaded at a whole string of growing tank terminals. Oil trucks carried the products through Maine, Vermont, and New Hampshire. And Newington folks prospered as they haven't prospered in nearly 200 years.

You have to know a little bit about the old Newington before you can appreciate the new; so if you'll bear with me, I'd like to talk a little history.

The first white man along the Piscataqua was British Captain Martin Pring, who moored his 50-ton bark, *Speedwell*, in Portsmouth harbor in 1603 and ventured upstream five miles or so along what is now the Newington "oil coast." He found embers of Indian campfires and some Indian boats, "made of the barke of a birch-tree," he said. He even brought one home to England, still marveling at "the largeness and capacitie thereof." He would have been impressed by the cargo capacities of the T-5 and T-2 tankers (200,000 and 135,000 barrels respectively) that today bear oil upstream to Newington's tank farms.

They used to call Newington "Bloody Point."

B. J. McQuaid is the founder and editor of the New Hampshire Sunday News. *A native son of the Granite State, he has been a newspaperman for 37 years.*

e Piscataqua

by B. J. McQuaid

One school of thought has it that the name derives from the Indian wars of colonial days. Another school claims that the name refers to the bloody noses that resulted from a series of pitched battles between those who wanted the town to be part of Portsmouth and those who wanted to go in with Dover. In the end the townsfolk wouldn't have either. In 1714 Newington was recognized as a separate and independent parish (it has never bothered to incorporate as a town) on the grounds that it had built its own church. Nobody was going to tell the people of Newington what to do; and you know, they're the same way today.

That church, by the way, still belongs to the town. It's the oldest Congregational Church in continuous operation in North America; and it's stood up well except for the bell in the steeple, which cracked soon after it was sent over as a gift from the townspeople of Newington, England. That bell was recast in 1764 by a gentleman from Boston, named Paul Revere, and there's been no trouble with it since.

Mr. Revere figured in the first act of rebellion of the Revolutionary War—and that was on December 13, 1774, not "the eighteenth of April, in seventy-five." Four months before Lexington, Paul Revere galloped to Portsmouth to warn that the British were coming to carry away a supply of ammunition from the fort there. A man named Tom Pickering led a party to the fort, seized the ammunition, and hid it where the British wouldn't find it. One cache was buried on an island off Newington.

To get back to the church, the first pastor was the Reverend Joseph Adams. He was offered the parish house, but he wasn't impressed; so he built his own home nearby, and there he entertained, among others, a favorite uncle named John—later our second President.

I could go on with this, but you get the idea. The church and the old houses, the green, the individualistic townsfolk—they're all part of a pattern.

Jet plane from nearby Air Force base flies high above historic Newington Meetinghouse, the oldest Congregational Church in continuous operation in North America.

The high point for Newington was about 1775, when the population hit 532. Industry built nearer the coast, and Portsmouth attracted most of the sea trade. By 1926 the population was down to 352 and still decreasing.

The first sign that things might be looking up came in 1936, when John Holden put up a few tanks for gasoline and heating oil on the northern tip of the Newington coastline. His small venture burgeoned when wartime rail shortages slowed the flow of overland oil to a trickle. He shortly found his terminal serving as supply depot for virtually every good-sized oil company operating in the area.

HOLDEN'S success was not lost on other oilmen. They liked the idea that the river channel was broad and deep, with plenty of room to turn the big ships around. They liked the fact that land on the shore was plentiful and cheap. There was none of the congestion that characterizes Portsmouth harbor, with its busy U. S. Naval Shipyard, now going full tilt on the production of atomic submarines. There were good roads to carry the petroleum products to market. And Newington's real estate and property taxes were low.

The entire setup was an invitation to the kind of enterprise that gladdens a Yankee's heart. It meant lower costs, increased efficiency, and the answer to a problem the oilman has in common with a whole lot of other folks: how to hold prices down in the face of inflationary pressures.

The invitation was quickly accepted. Terminals went up all along the Newington shore, either on their own or in connection with new industry. When the Public Service Company, the State's single large producer of electrical energy, built a plant on the Piscataqua, for example, a fuel company put up storage facilities alongside. At the time, the utility burned coal as its principal fuel, but the plant was adapted to shift to oil as comparative costs might dictate. The utility people tell me that the efficiency and economy of oil over coal were never better demonstrated. Today the plant burns a million barrels of oil for every 50,000 tons of coal.

John Holden, by the way, is a prophet who has won honor (and profit) in his native land. He's 69 years old now, and his pioneer Atlantic Terminal is now affiliated with an oil company, but he remains as president. He's had a pleasure few men have, that of seeing his dreams come true; and he feels the progress along the Piscataqua is only just beginning. "We haven't scratched the surface," he says. An example of what he means is the giant Simplex Wire and Cable Company operation on the Newington shore. The plant ships submarine cable that exceeds in total dollar value the exports of any other seaport north of Boston.

One of the most interesting terminal operations is also the newest, an underground tank farm on the Newington shore which serves the mammoth Pease Air Force Base, a Strategic Air Command installation. The base came to town in 1953, preempting half of Newington's then 12-square-mile area. The census counts the 2,000 base residents as part of Newington's population; but the folks in Newington point out that the airmen pay no taxes, take no part in town activities, and send their children to Portsmouth schools. In a word, they aren't Newingtonians. And personally, I'd rather argue with the Census Bureau than dispute the matter with the men of Newington.

Well, that just about brings us up to date, except for a few statistics and a little tying together of some historical strings.

The statistics concern finances. Industry, meaning oil and Simplex, pays 90 cents of every tax dollar the town collects. In 1944 the collections were only $8,000; last year's taxes totaled $96,609.

Newington's frugal Yankees have spent their new tax wealth on a big new civic center and a modern grade school. The roads are well paved and lighted, the fire and police departments lack for nothing in the way of modern equipment, and the old Congregational Meetinghouse gleams with a fresh coat of white paint.

It is safe to say that New Hampshire's oil strike has been a rewarding experience. And that holds true not only for wealthy little Newington but for all the areas in the three States that are served more efficiently because of the tidewater oil developments.

THE historical matter concerns the town itself and the people. It is of some interest, for example, that a lineal descendant of the Reverend Joseph Adams still lives in the house built back two centuries ago. He's Granville Knox, the town planner and husband of the town clerk. He brings up matters concerning the future of Newington at town hall meetings in the new civic center, and these matters are debated with all the traditional Newington vigor before a board of selectmen.

The new buildings have somewhat changed the town's center, but the church remains steadfast, and there are many weatherbeaten colonial homes still to be seen. The old brick library is as it was.

The aura of Newington's historic past lingers mostly, though, in the persons of its citizens. I was walking near the new Air Force tank farm when I was challenged by a lean, lantern-jawed civilian guard named Alfred Pickering. I learned that he was a descendant of that other Pickering who made off with the ammunition when the British tried to move in.

Alfred Pickering was a storehouse of historical information. As he talked, I thought that he was not so very different from his eminent ancestor. In his own way, guarding the air base terminal, he was standing on the ramparts too.

WHIRLYBIRDS OVER THE OIL PATCH

by George N. Hebert

LAWRENCE PAULSON was mowing the grass around his motel in Ogden, Utah, when he heard a whirring noise overhead. He looked up to find a hovering helicopter; at the controls was a potential overnight guest.

"I was flabbergasted," Paulson recalls. "But I motioned him in to land. I don't care which direction my business comes from, just so long as it comes."

By the time the helicopter took off next morning, Paulson had recovered from his initial shock. He had also learned some out-of-the-way facts about flying, the oil industry, pilots, and the company whose name was printed on the side of the whirlybird: Petroleum Helicopters, Inc.

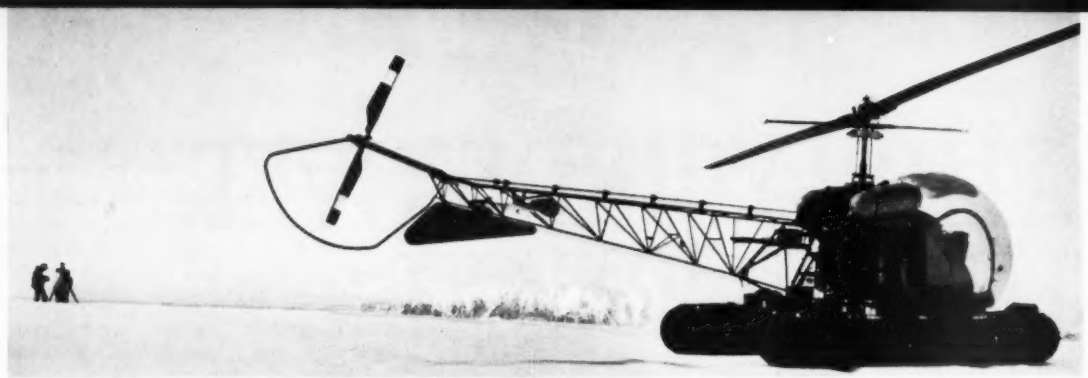
PHI is the largest helicopter operating company in the world. Its headquarters is in Lafayette, Louisiana. Its flying crews are scattered around the globe. Its 53 copters log an average of 4,000 hours of flight a month.

"We started out in 1949 with three pilots, three mechanics, and three copters," says PHI vice president Frank Lee. "For a while there we thought we had three too many of everything."

Lee is chief operations officer of the company. He works 12 hours a day in long, unbroken stretches supervising PHI's 200 employees. "Sometimes when I look back, I wonder how we ever got this far," he says.

When the company was formed, the helicopter was still considered by many to be a mechanical freak. Most Americans had never seen one except in photographs of military operations. The oilmen Lee approached for business liked the idea of using copters, but they had to be shown.

New turbine-powered helicopter is used to carry men and supplies to oil rig far out in the Gulf of Mexico.



Search for oil carries geological survey team to Alaskan wilderness where copter's ruggedness and versatility pay off.

The company's first assignment was typical of those that would follow. "I mean," says Lee, "it was a headache."

The principle was perfect. An oil exploration party working in the Louisiana swampland could only move at a three-mile-an-hour pace, laying wire used in electronic tests. The helicopter could do the job at 60 miles an hour, or at least that was the theory.

"Trouble was," Lee says, "the copter made most of the equipment they had obsolete." The wire, for example, was too fragile to be fed out from a speeding copter. PHI's solution: a special reel installed in the cockpit; when time came to lay the wire, the copter flew *sideways* down the trail while the delicate cable was reeled out.

That first assignment also illustrated a major area of potential copter business. "Oilmen go to crazy places to find oil," Lee says. "Swamps, jungles, deserts—places where regular transportation breaks down. We sold them on the idea that even a crazy-looking contraption like the copter was all right if it displaced dugout canoes and burros."

During the first years, PHI concentrated on oil exploration work, ferrying men and supplies into inaccessible areas of the globe. Then in 1954 new horizons opened up. Oilmen began to drill large numbers of wells in the Gulf of Mexico.

The offshore operations were ready-made for copters. Joe Bolen, a solemn-faced ex-Marine flyer, puts it simply: "When you've got to move fast, boats aren't good enough."

Bolen runs PHI's offshore operation in Morgan City, Louisiana, one of 12 company bases along the Gulf Coast. The copters under his direction service rigs that are, on the average, 60 miles from land. They carry men and supplies that distance in less than an hour regardless of how high the waves are; a boat requires four or five hours to make the trip in a calm sea.

"Another thing," Bolen adds. "Copters come in from on top. If the Gulf's rough, a boat captain has to wait for a calm to tie up to the rig."

Time is money in offshore drilling. A wildcat well in the Gulf can easily cost $2 million. If drilling has to halt because an engine fails, every idle minute until a new engine is brought from shore adds to the cost. The same economics apply when a specialist must be taken to the rig to deal with a mechanical emergency, or when an executive must be brought in to make an on-the-spot decision.

Oil companies have invested some $3 billion in offshore leases and operations; returns thus far have been less than $1 billion. The companies are out to balance that figure, and helicopters help.

Fast transportation saves money; it also saves lives. A helicopter ambulance service is part of every PHI offshore contract, and Joe Bolen's men are on standby alert in the event of accident or sickness aboard a deepwater rig. "A few hours make a big difference if you've got a ruptured appendix," Bolen says.

The men aboard the rigs have other, less dramatic, reasons for admiring copter service. A 60-mile boat ride in rough water is virtually guaranteed to bring on seasickness. The copter ride is smoother and faster. "A lot of the men are Cajuns," Bolen comments, "and they were born to

Adaptable helicopters can pick up pipe from depot, move it miles in minutes, then lower it gently into a ditch.

PHI Vice President Frank Lee (right) and aide L. L. McCombie schedule activities of company's 53 copters and 200 employees.

boats, but they've taken to copters in a big way."

The companies feel that swift, efficient crew changes are an important justification for helicopter service. From their view, it means that men arrive at the rig refreshed and ready for duty.

PHI men can spin stories of emergency offshore flights by the hour, but they "want to make sure nobody gets the idea it's limited to contract work."

"Once I was stringing pipe through the Terrebonne Parish marsh," Bolen says, "and I spotted a couple of guys in a small fishing boat, waving their shirts like crazy. So I dropped down to 20 feet and hovered while they went through the sign language routine. Seems they were out of water and food, their motor'd conked out, and the bugs had eaten them all night.

"I couldn't land because the copter had skids, not pontoons. So I flew over to the Intracoastal Canal and scared hell out of a tugboat captain by perching a few yards over his pilot house. He finally got the idea and signaled he'd follow me. So off we went, me and the copter playing seeing eye dog to the tug. Those guys in the boat were real happy to see us."

The helicopter has come to take an important role in Gulf Coast emergency transport. Wind socks and heliports are permanent installations at the Ochsner Foundation Hospital in New Orleans and at hospitals in Galliano, Morgan City, and Lake Charles.

When Bolen talks of "stringing pipe," he touches on another area where the copter has gone into partnership with the petroleum industry: oil pipelines.

Here again, the copter enables oilmen to move over rough terrain with the greatest of ease. The whirlybirds are used to survey the area through which the pipeline will be built. They transport crews and supplies. They pick up lengths of pipe from a central supply point, move it miles in minutes, then gently lower it into place in the ditch. Once the line is completed, the copters are sometimes placed on permanent duty patrolling pipelines, watching for any damage along the line.

Some of the pilots call the copters "aerial cranes." Frank Lee has dubbed them "sky hooks."

"You can fly a pipeline supervisor along the right-of-way for miles, checking work progress in detail, without ever getting closer to the ground than 15 or 20 feet. When he says 'stop,' you just hang the copter in the air, and it stays put until you get the word to move on."

The same aerial-crane/sky-hook capabilities have made the copter a vital tool in land-based drilling and production work.

Lee tells of one company that was bound and determined to drill a wildcat well deep in the back country of Colombia. "It would have taken a year to slash a road through the jungle," he says, "so they took everything in by copter. Pumps, generator plant, drill pipe, supply sheds, huts for the men. The copters brought in the derrick section by section. Then they helped set it up."

What happened to the well? "Oh, it was a dry hole," Lee says. "But the copters showed they could save time and money. And that time and money went for more wildcats."

Lee's favorite story, though, deals with PHI pilot Leon Mellinger and his ill-fated trip to the Middle East. Here's Mellinger's version:

"Seems an Italian drilling company bought a copter for drilling work in Iran. They needed an instructor to teach their pilots how to fly it; so they came to us, and I got the job. So I traveled thousands of miles; and when I arrived, there weren't any pilots available. Nobody but a crew chief and some mechanics who couldn't speak a word of English. And my Italian isn't much. For two months I was stuck there; and when I finally started instructing, our lives and the well-being of that copter depended on nothing but sign language and illustrated manuals."

Between domestic and overseas assignments, PHI pilots and copters have undertaken virtually every oil industry job the whirlybirds have performed—and a few outside the industry. PHI men spray bananas in Colombia, supply bases along the DEW (Distant Early Warning) Line in Greenland, patrol powerlines.

Perhaps their most improbable assignment involves the protection of fruit and vegetable crops from frost. When the copter flies slowly upward, its rotor blades force a warm blanket of air into the lower layer of cold air, thereby raising ground level temperatures above freezing.

As Frank Lee says, "These copters can do anything."

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oyees.

Blessings from

Brimstone

by Raymond J. Brady

The malodorous mineral called sulfur has a long and curious history. It plays a little-known but vital role in the well-being of the nation.

TOUCH almost anything around you—anything from paper to paint and from medicine to matches —and you are touching the yellow, evil-smelling substance known as sulfur.

The family car runs on gasoline, but sulfur made it possible to refine that gasoline from crude oil and to produce the tires and steel frame of the car as well. Sulfur goes into the fertilizer and the new insecticides and pesticides that have so dramatically increased the world's food-raising potential. The very security of the nation is dependent upon a supply of sulfur for the production of explosives.

Yet the history of this versatile stone is little known and understood, and the record of its development as the cornerstone of a vital American industry is seldom exposed to public view.

Sulfur has been used by man since the dawn of time. Cavemen burned the yellow stone to ward off evil spirits. It appears in the Bible as the brimstone that poured from a vengeful heaven. The Chinese used it to make gunpowder in 500 B.C., and Homer's Ulysses burned sulfur to purify his home after his travels. In the Middle Ages alchemists used it in an effort to turn base metals into gold.

From Roman times onward the world's only major source of sulfur was the Mediterranean island of Sicily. There peasants laboriously pick-and-shoveled it out of the ground, and stevedores stood waist-deep in water to load it onto seagoing ships. Even as late as the 1880's—when America was beginning to turn out large quantities of gunpowder, bleaches, and fertilizers —the world was still dependent on the ships from Sicily. In wartime an enemy had only to block the sealanes to stop all production in a score of vital American industries.

The situation was awkward and potentially dangerous; but, unknown to the men of that day, a solution was on the way. In 1859 a railroad conductor named Edwin L. Drake had brought in the world's first commercial oil well, and the drilling technique he applied successfully in Pennsylvania laid the groundwork for the yet unborn domestic sulfur industry.

Two decades passed and then a tall, dignified man with an immaculate Vandyke beard entered upon the scene. His name was Herman Frasch and he had already made his mark in the primitive oil industry of the day. He had developed a process that removed smelly sulfur from the crude oil of Ontario and the Middle West, thereby permitting the oil to be burned in house lamps. He would later develop a method of pumping acid into seemingly used-up oil wells to recover additional quantities of crude.

The more Frasch thought about oil and sulfur, the more he saw another link between the two. A deposit of sulfur had long been known to exist in the swamps of Louisiana; but, unlike the Sicilian deposits, it lay some 200 feet under the earth, and nobody had yet found a way to bring the sulfur up.

As Frasch saw it, he could use Drake's drilling process to get down to the sulfur deposit, then pour boiling water down the well. This should melt the solid sulfur so that it could be pumped to the surface in a molten, golden stream. And Herman Frasch, the man who had won his

The largest steel island ever built is this sulfur "mine" located seven miles off the Louisiana coast. It is the world's first offshore sulfur extraction operation.

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spurs by getting rid of sulfur, now set about trying to recover it.

Under the broiling sun of the Gulf Coast swamplands Frasch and his crew cut down trees and stoked their fires. The hot water was sent rushing down, and the pumps began working. Then one day in 1894 it happened—a yellow film formed on the rods leading out of the well.

But final success was not to come so easily. Frasch had overlooked a key factor: his process required far more fuel to boil water than he had calculated. The swamp could yield only so much wood, and coal would cost him $4.05 a ton—too much to enable American sulfur to compete in price with the Sicilian product.

The solution to his problem came from Texas, with a timing that Frasch must have considered nearly miraculous. Captain Anthony Lucas brought in a well that opened up Spindletop, one of the great oilfields of all time. The price of petroleum dropped sharply as Spindletop production rose, and further discoveries in the years that followed assured the role of oil as a low-cost, high-energy fuel.

NO MAN had better use for a low-cost fuel than Herman Frasch. Without it he was licked. Now he could have it delivered from Spindletop, just 30 miles away, at a price of 60 cents a barrel. Down came the price of American sulfur; the newborn infant had the one nourishment it needed to survive.

Meanwhile Anthony Lucas, he who had discovered Spindletop, was continuing the hunt for new oil reserves. He had long studied the salt domes—great bare patches of land —that poke their way up all along the Gulf Coast. Lucas believed they were a telltale sign of oil. And when his theory paid off at Spindletop, he made his famous vow: "I'm going to punch a hole in every pimple on the Gulf Coast!"

Without realizing it, Lucas had charted the location of the 20th century sulfur industry. As we know today, not every salt dome contains either oil or sulfur; most contain neither. All American deposits of sulfur, however, have been found in the caprock of these massive pillars of salt that have been thrust skyward by upheavals of the earth. The result of Lucas' leadership was that again and again drillers in search of oil discovered sulfur instead.

Sometimes the sulfur was more valuable than an oilfield might have been. Consider what happened in a semitropical tangle of jungle not far from Houston, Texas, in the 1920's. Oilmen had labored long and hard in this area to find crude, but production from their wells was small. The showings of sulfur were so strong that the field was leased by a newly formed sulfur firm.

Out of that lease, with its forlorn trickle of oil, came a find that rivaled Spindletop. For well over 30 years Boling Dome has been the kingpin of the American sulfur industry, often producing nearly half of the nation's supply. Still going strong today, it already has pumped an estimated 50 million tons and shows no sign of slowing down.

The close tie between oil and sulfur remained even after World War II. In the early 1950's the Korean War soaked up huge amounts of sulfur, and the supply of the vital substance was running low. In peacetime such a situation could cause an industrial slowdown; in wartime it could mean national defeat.

Once more oilmen stepped into the picture in the persons of three brothers named Brady, who had given up wildcatting for oil on the Mexican Gulf Coast and had headed for the interior—the wild jungles of the Isthmus of Tehuantepec.

The brothers had located an old geological map that dated back to the days of the discovery of oil in Mexico early in this century. On the map was the same type of salt dome that had fired up Captain Lucas, and the Brady boys felt certain the domes held sulfur.

After long years of struggle in the jungle, the brothers found their sulfur, in vast quantities and in time to meet the Korean War shortage. By 1959 the Mexican sulfur industry was shipping a million tons of the stone, fully a sixth of the American industry's own production.

Thanks to still other oilmen, the world will not have to worry about another shortage of sulfur for a long time to come. New deposits have recently been found in the Gulf of Mexico. And many oil and sulfur companies are joining forces to "scrub" natural gas, taking out its sulfur as a valuable byproduct. This method is being used with particularly good results in the great natural gas fields of Canada.

IN THE customary pattern of sulfur discovery and production, oilmen have done the discovering and specialized sulfur outfits have handled the production aspects. But there have been exceptions.

The Jefferson Lake Oil Company was looking for petroleum in Louisiana's Lake Peigneur, near the island home of the famous actor Joe Jefferson. One dry hole followed another, until Jefferson Lake could finance just one more try. Should the company leave well enough alone, or exhaust its few remaining dollars in drilling another well?

In the tradition of the oil industry Jefferson Lake decided to try again, and discovered not oil but an underground mountain of sulfur. Undaunted, the company went out of the oil business and into the sulfur business.

There is, however, a postscript to the story. Deciding that it had had more than its share of the risks of finding petroleum, Jefferson Lake leased its oil rights to another firm. On its very first try the oil company hit a well that produced no less than 70,047 barrels of crude in its first year.

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Moon and searchlights illumine round-the-clock operations at a drilling rig in the Southwest where the nation's requirement for oil, in Shakespeare's words, "Doth make the night joint-labourer with the day."